

FIG. 1

FIG. 2

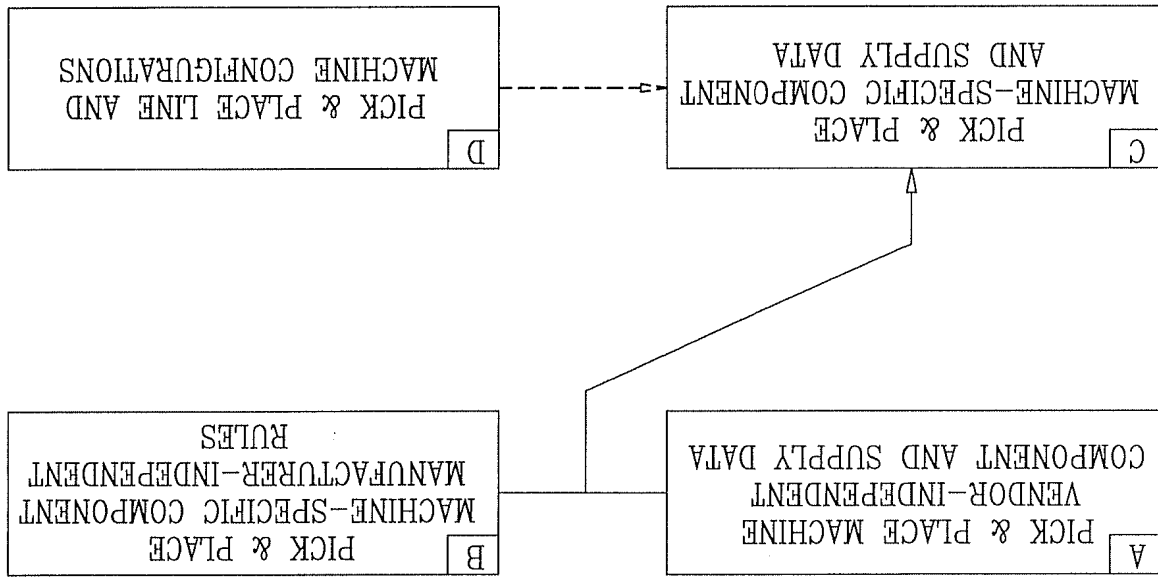


FIG. 3

A

PICK & PLACE MACHINE VENDOR-INDEPENDENT COMPONENT AND SUPPLY DATA

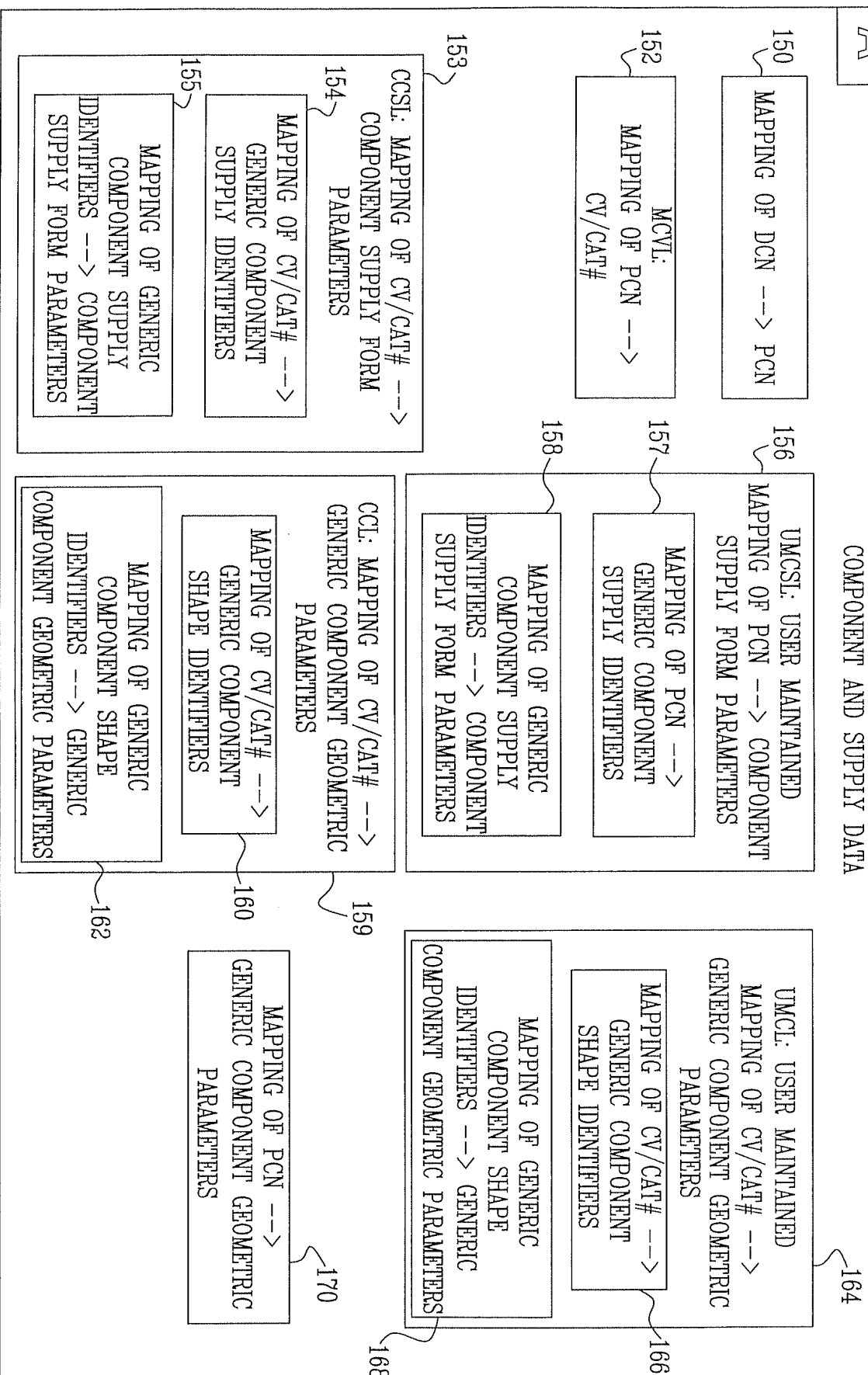


FIG. 4

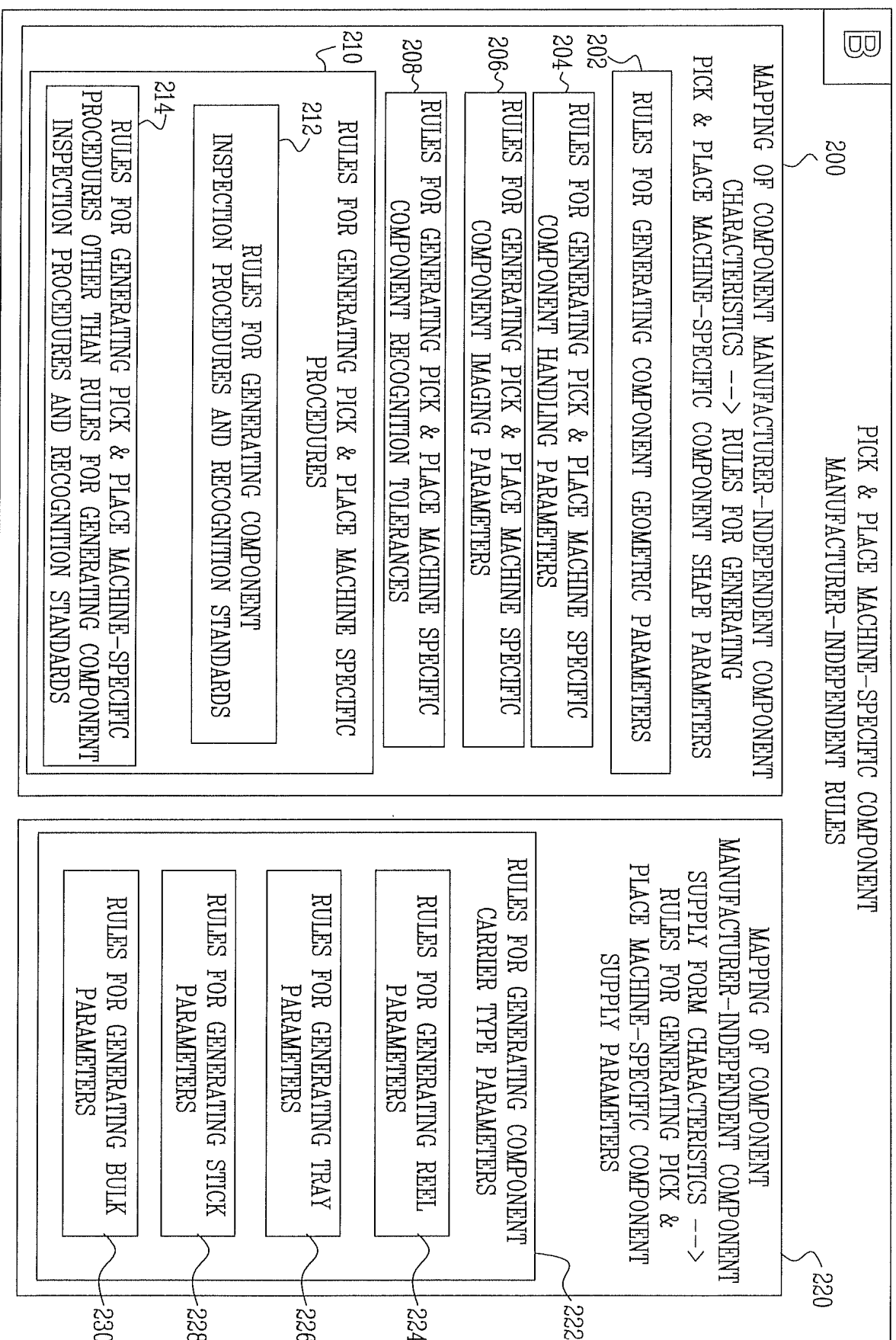


FIG. 5A

PICK & PLACE MACHINE SPECIFIC COMPONENT REEL PARAMETER	RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT REEL PARAMETER
MACHINE FEED	$=(\text{REEL PITCH}/\text{MACHINE FEED DISTANCE})$
MACHINE SUB-FEED	$\begin{aligned} &\{ \text{IF (REEL PITCH - ((REEL PITCH}/\text{MACHINE FEED} \\ &\text{DISTANCE}) * \text{MACHINE FEED DISTANCE}) > } \\ &0 \} \text{ THEN } =(\text{REEL PITCH - ((REEL PITCH}/\text{MACHINE} \\ &\text{FEED DISTANCE}) * \text{MACHINE FEED} \\ &\text{DISTANCE})}/\text{MACHINE SUB-FEED DISTANCE}) \\ &\text{ELSE NOT RELEVANT} \end{aligned}$
<div><div>•</div><div>•</div><div>•</div></div>	<div><div>•</div><div>•</div><div>•</div></div>
NUMBER OF SLOTS	$\begin{aligned} &\text{IF } \{ (\text{TAPE WIDTH - ((TAPE} \\ &\text{WIDTH}/\text{SLOT WIDTH}) * \text{SLOT WIDTH}) == 0 \} \\ &\text{THEN } =(\text{TAPE WIDTH}/\text{SLOT WIDTH}) \\ &\text{ELSE } =((\text{TAPE WIDTH}/\text{SLOT} \\ &\text{WIDTH})+1) \end{aligned}$

FIG. 5B

COMPONENT MANUFACTURER-INDEPENDENT PICK & PLACE COMPONENT CHARACTERISTIC (COMPONENT TYPE) MACHINE SPECIFIC COMPONENT SHAPE PARAMETER		BGA	QFP	CONNECTORS
PICKUP DEPTH	$\{$ 242	=COMPONENT HEIGHT	=COMPONENT HEIGHT	=COMPONENT HEIGHT
...
NAMED NOZZLE	NOT RELEVANT	NOT RELEVANT	NOT RELEVANT	IF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))>=2 && MIN(X DIMENSION, Y DIMENSION)>=8} THEN ="LARGEST NOZZLE" ELSEIF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))<2 } THEN NOT RELEVANT ELSE THEN ="MEDIUM NOZZLE"
MINIMUM NOZZLE	=MIN(X DIMENSION, Y DIMENSION)*0.7	=MIN(X DIMENSION, Y DIMENSION)*0.7	=MIN(X DIMENSION, Y DIMENSION)*0.7	IF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))<2} THEN =MIN(X DIMENSION, Y DIMENSION)*0.7 ELSE NOT RELEVANT
MAXIMUM NOZZLE	=MAX(X DIMENSION, Y DIMENSION)*0.95	=MAX(X DIMENSION, Y DIMENSION)*0.95	=MAX(X DIMENSION, Y DIMENSION)*0.95	IF {(MAX(X DIMENSION, Y DIMENSION)/MIN(X DIMENSION, Y DIMENSION))<2} THEN =MIN(X DIMENSION, Y DIMENSION)*0.95 ELSE NOT RELEVANT

246

244

FIG. 6

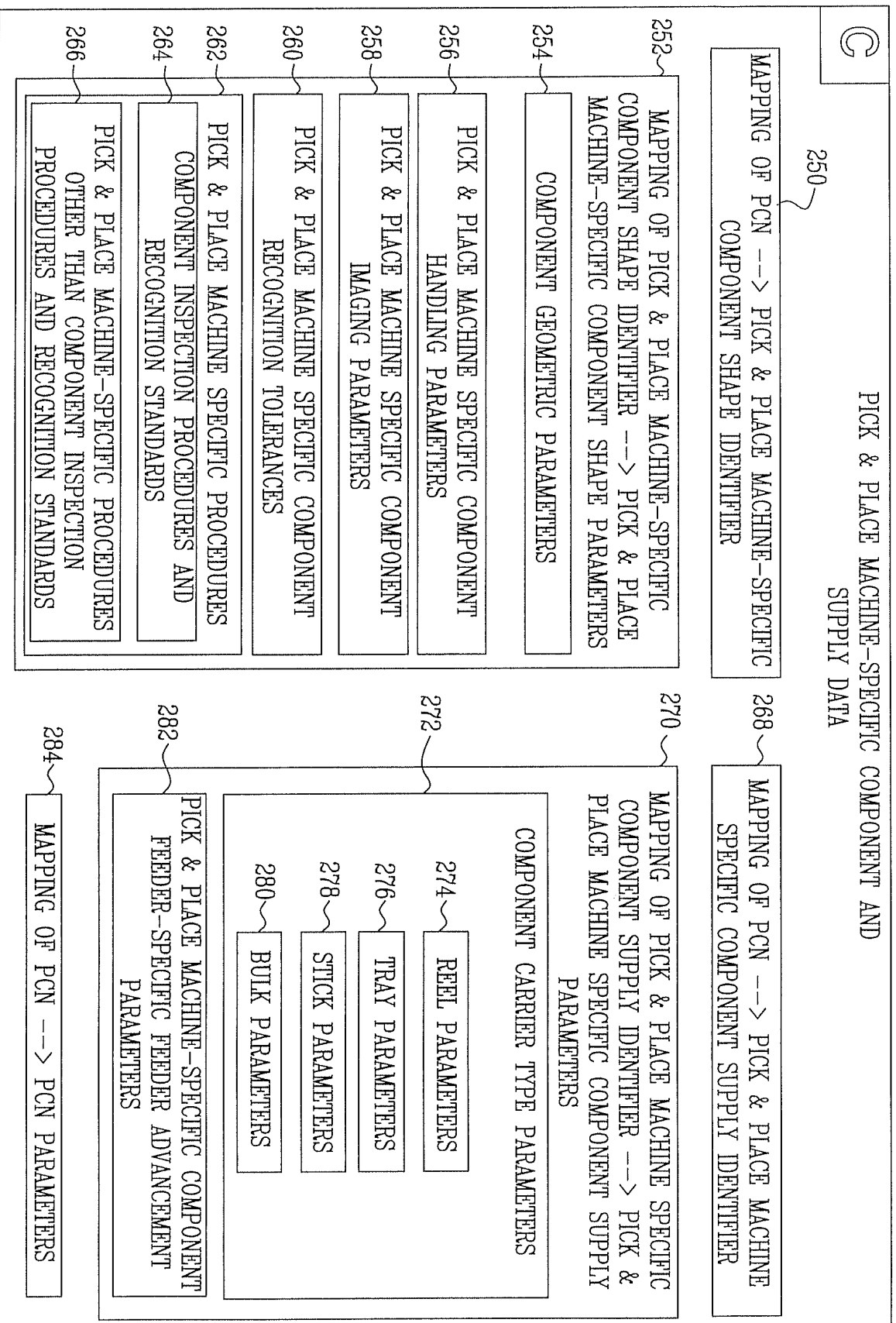
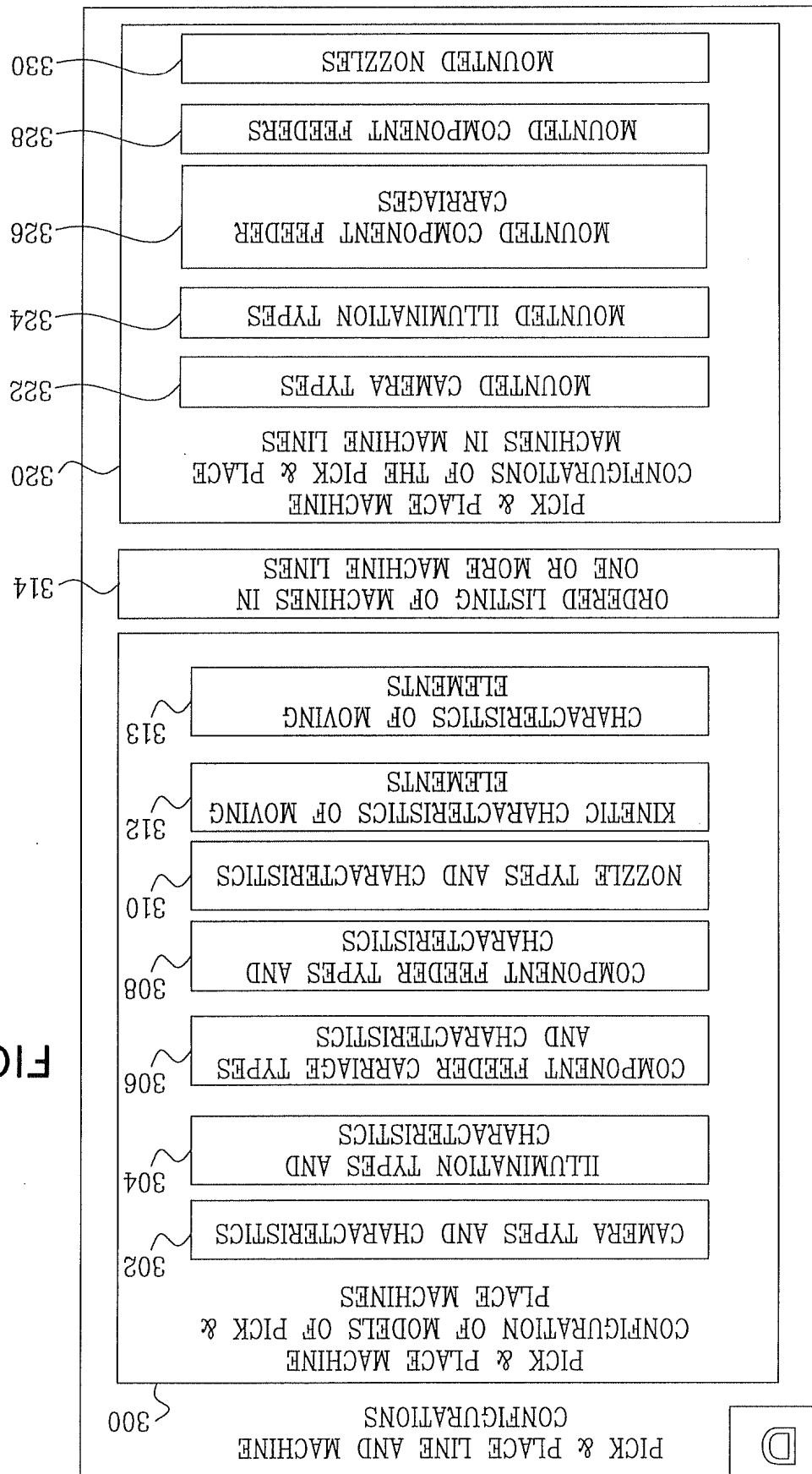
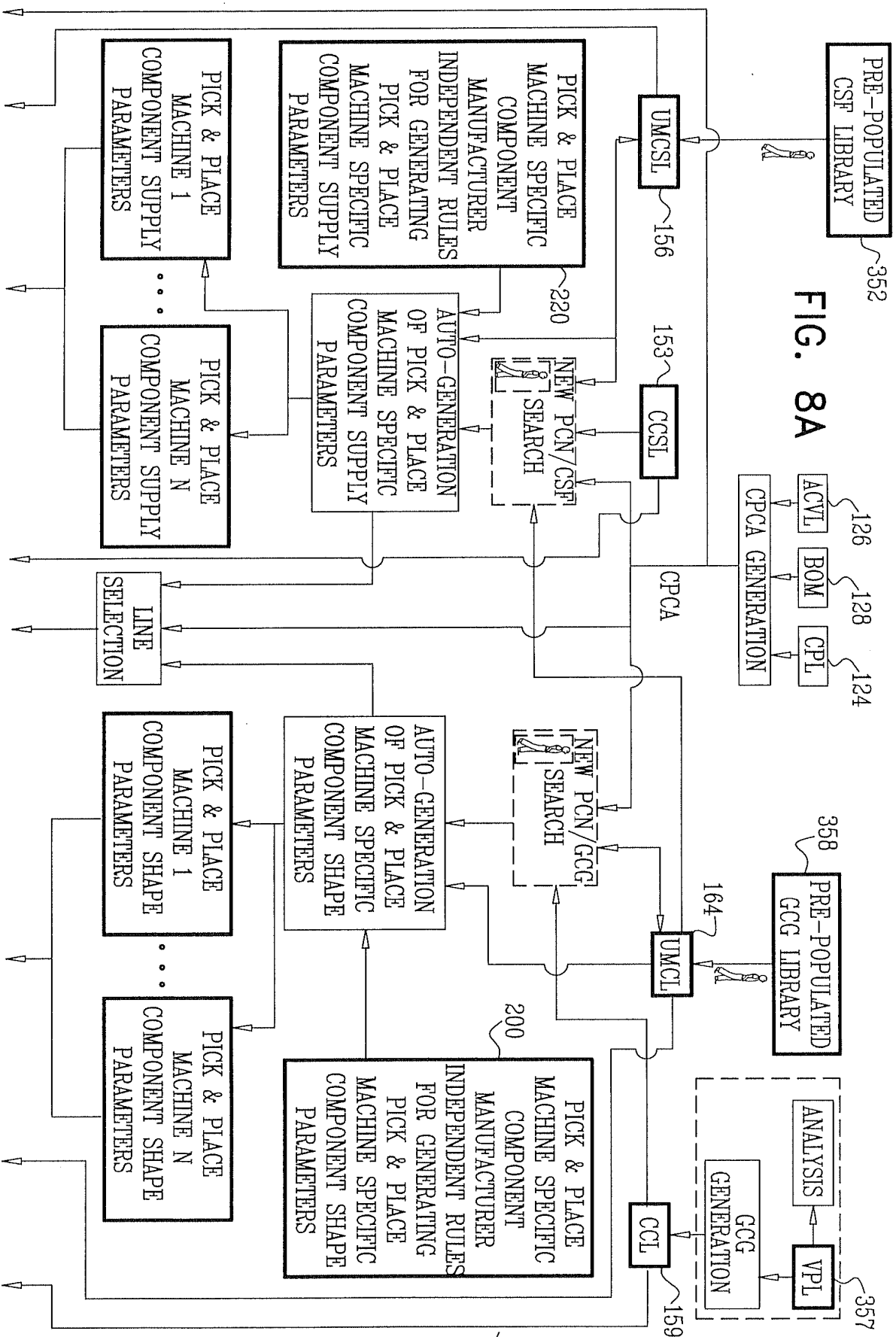


FIG. 7





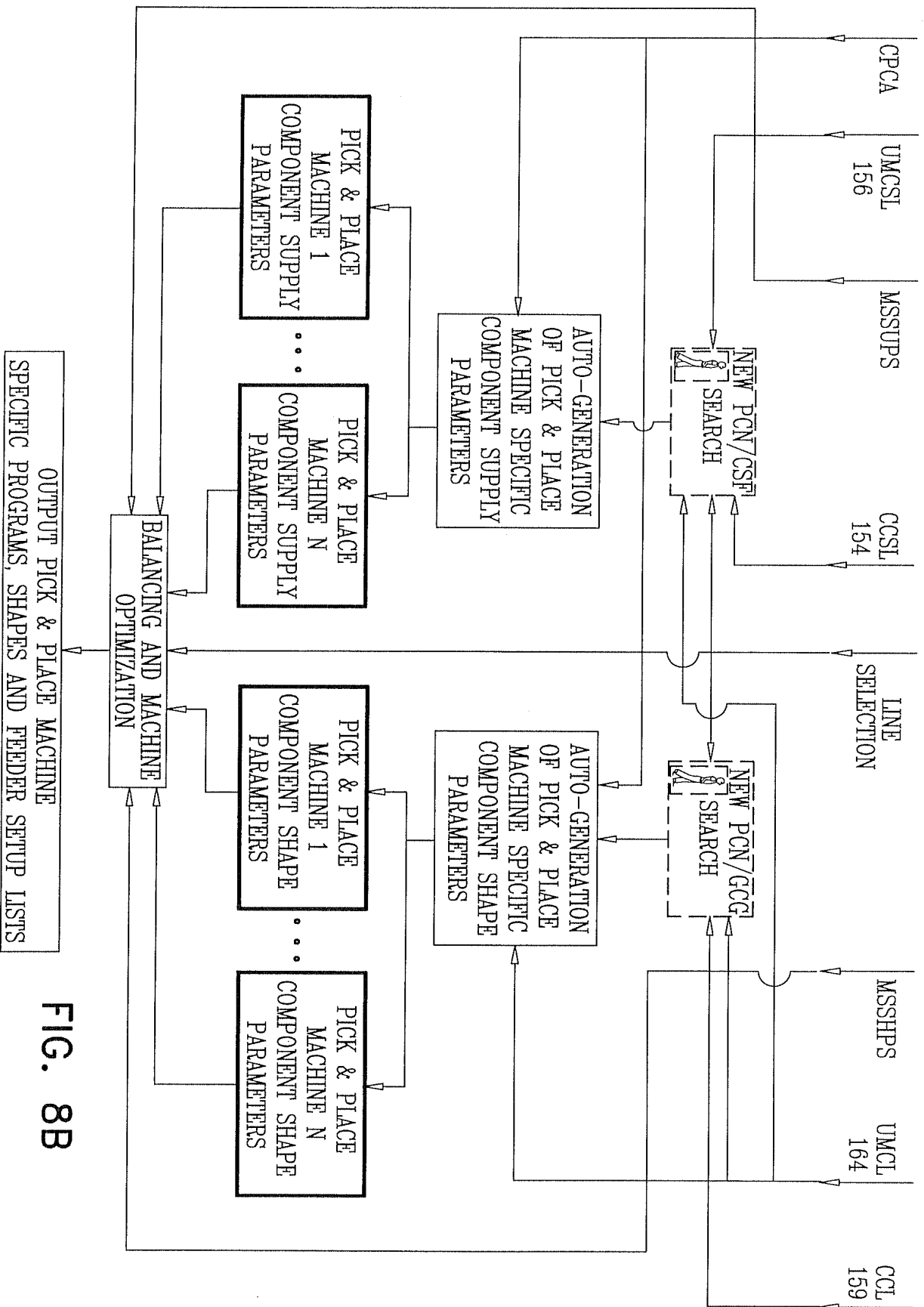


FIG. 8B

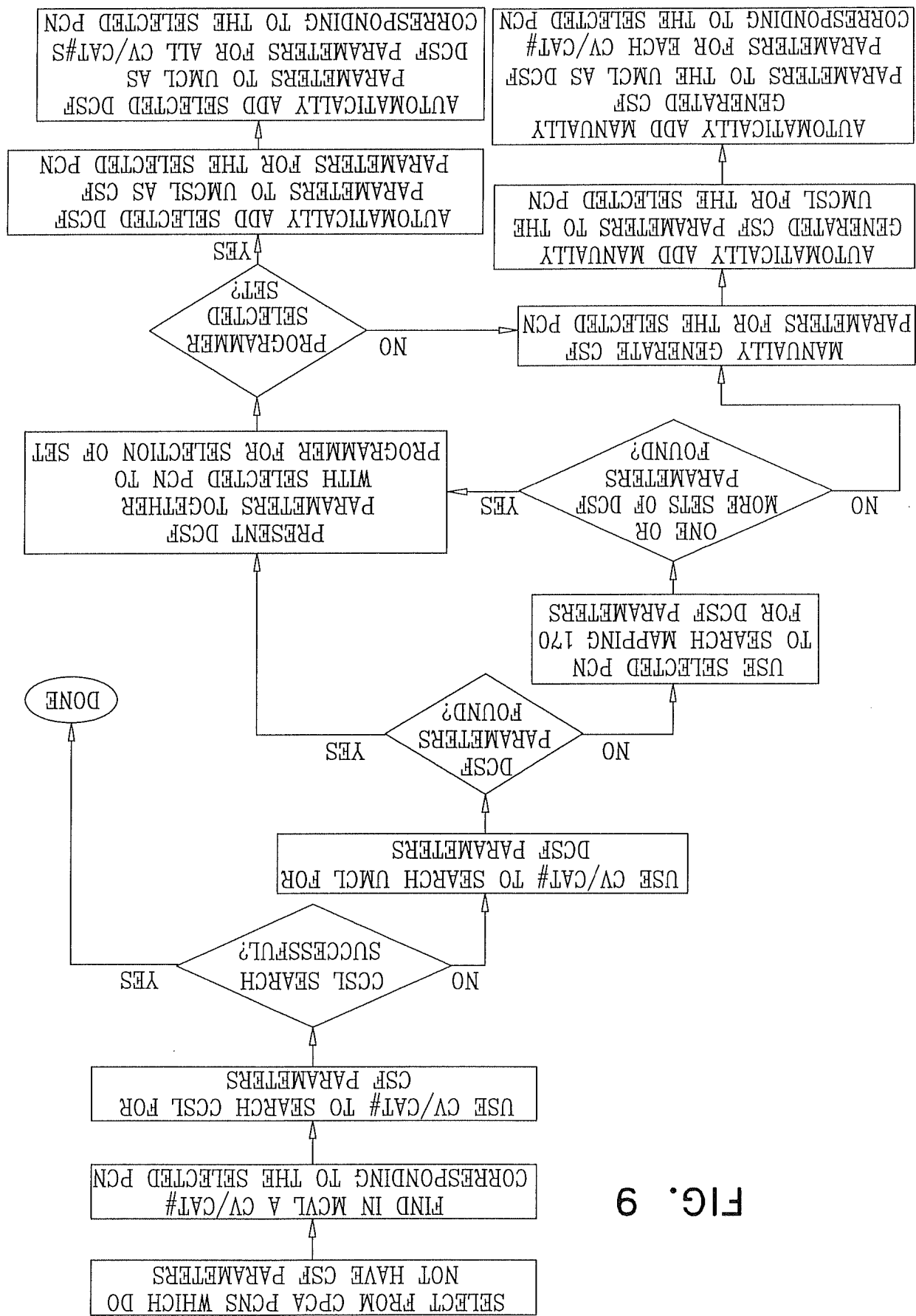


FIG. 9

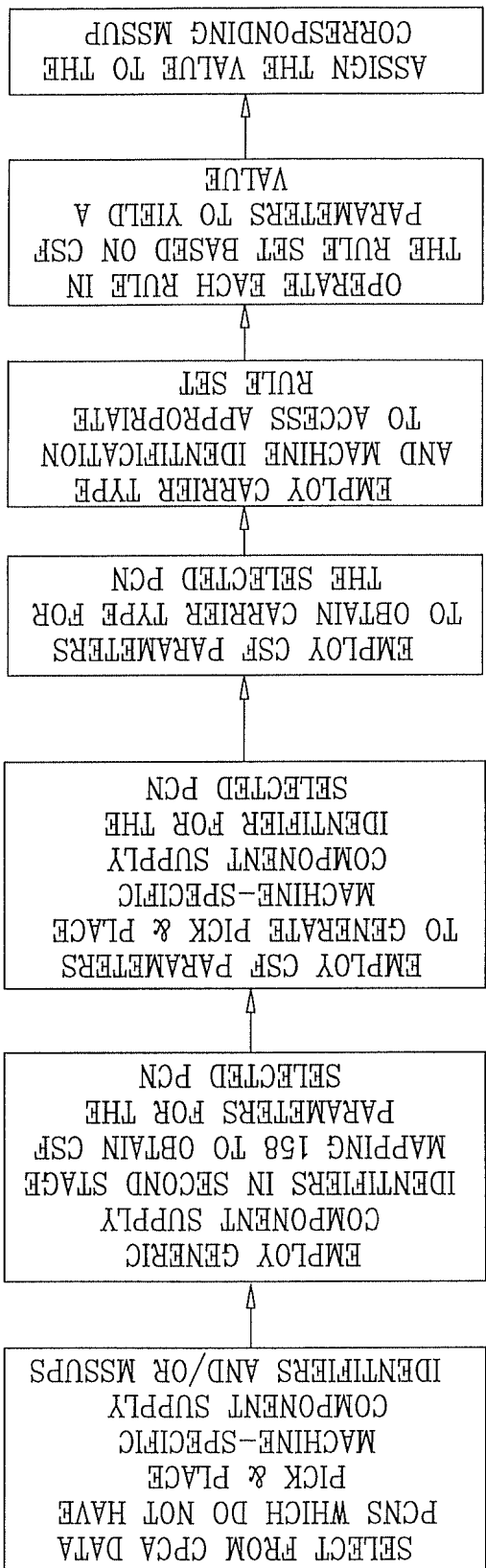


FIG. 10

FIG. 11A

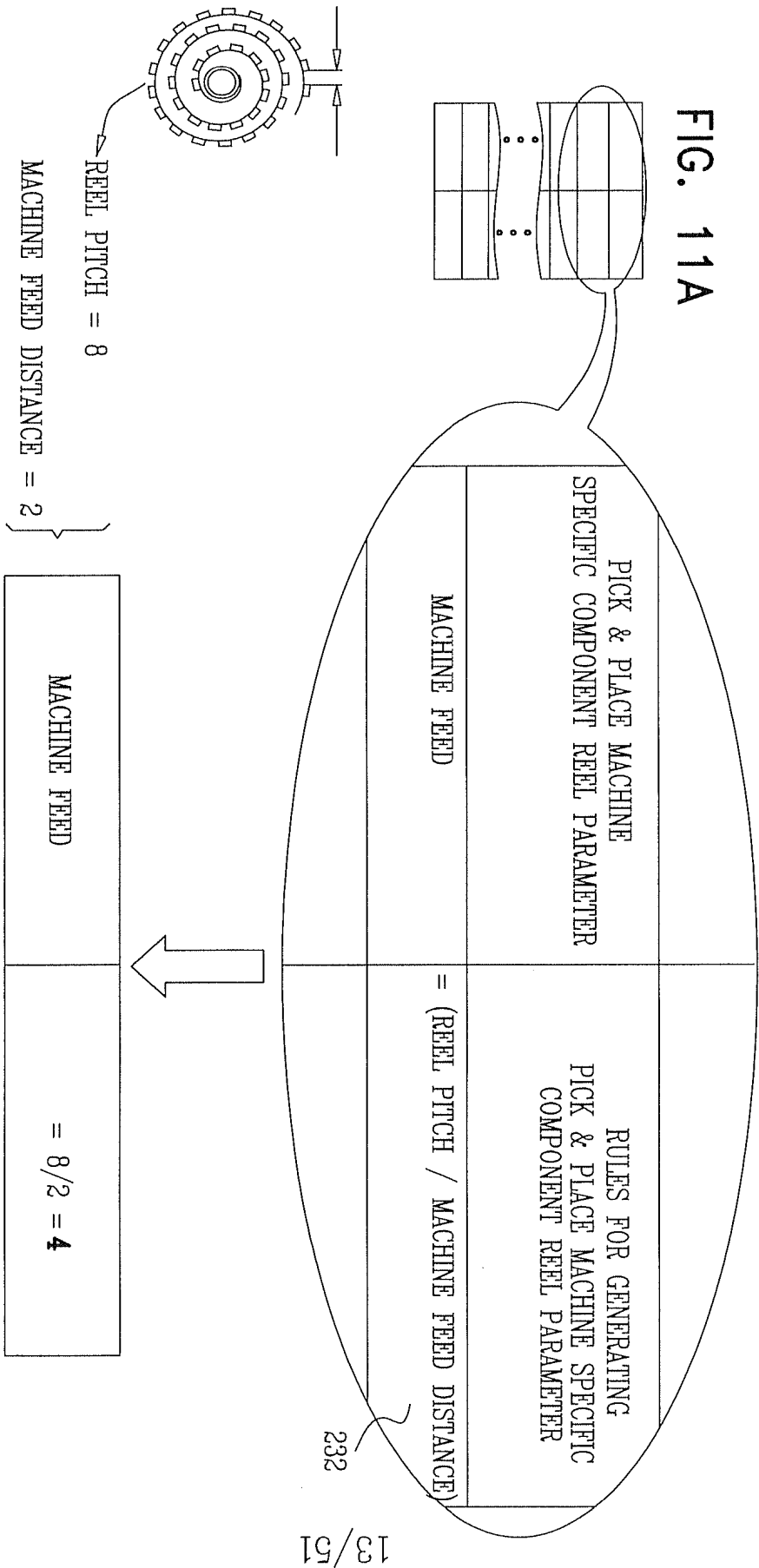
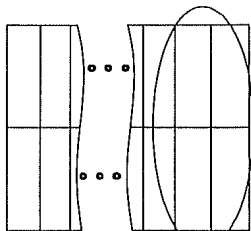


FIG. 11B



PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER	RULES FOR GENERATING PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER
NUMBER OF COMPONENTS IN X DIMENSION	BINARY CONVERSION OF # OF COMPONENTS
NUMBER OF COMPONENTS IN Y DIMENSION	BINARY CONVERSION OF # OF COMPONENTS

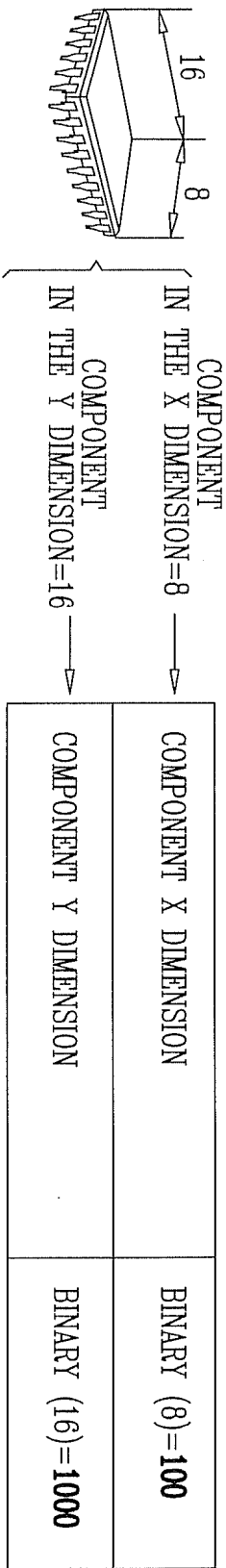


FIG. 11C

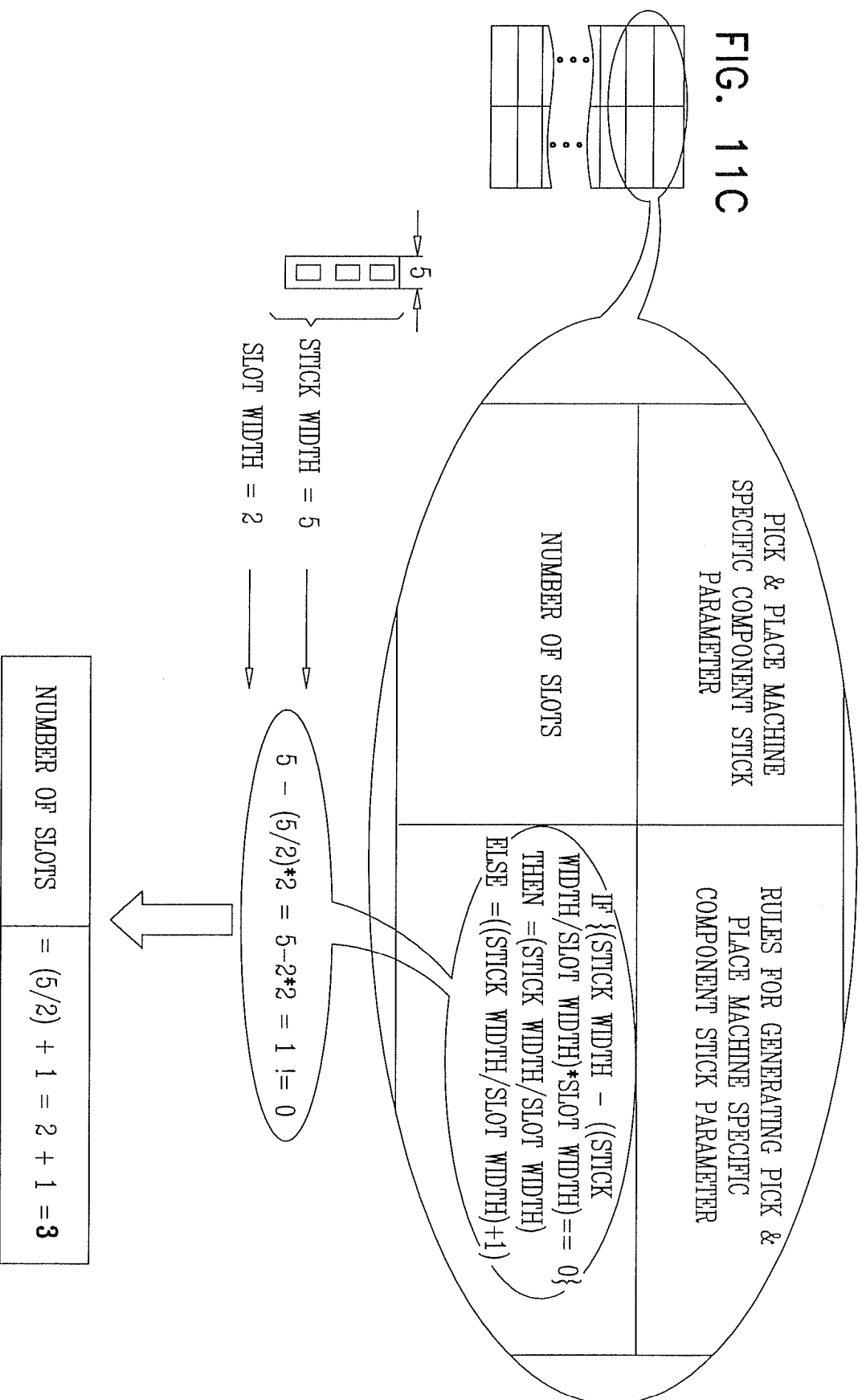


FIG. 11D

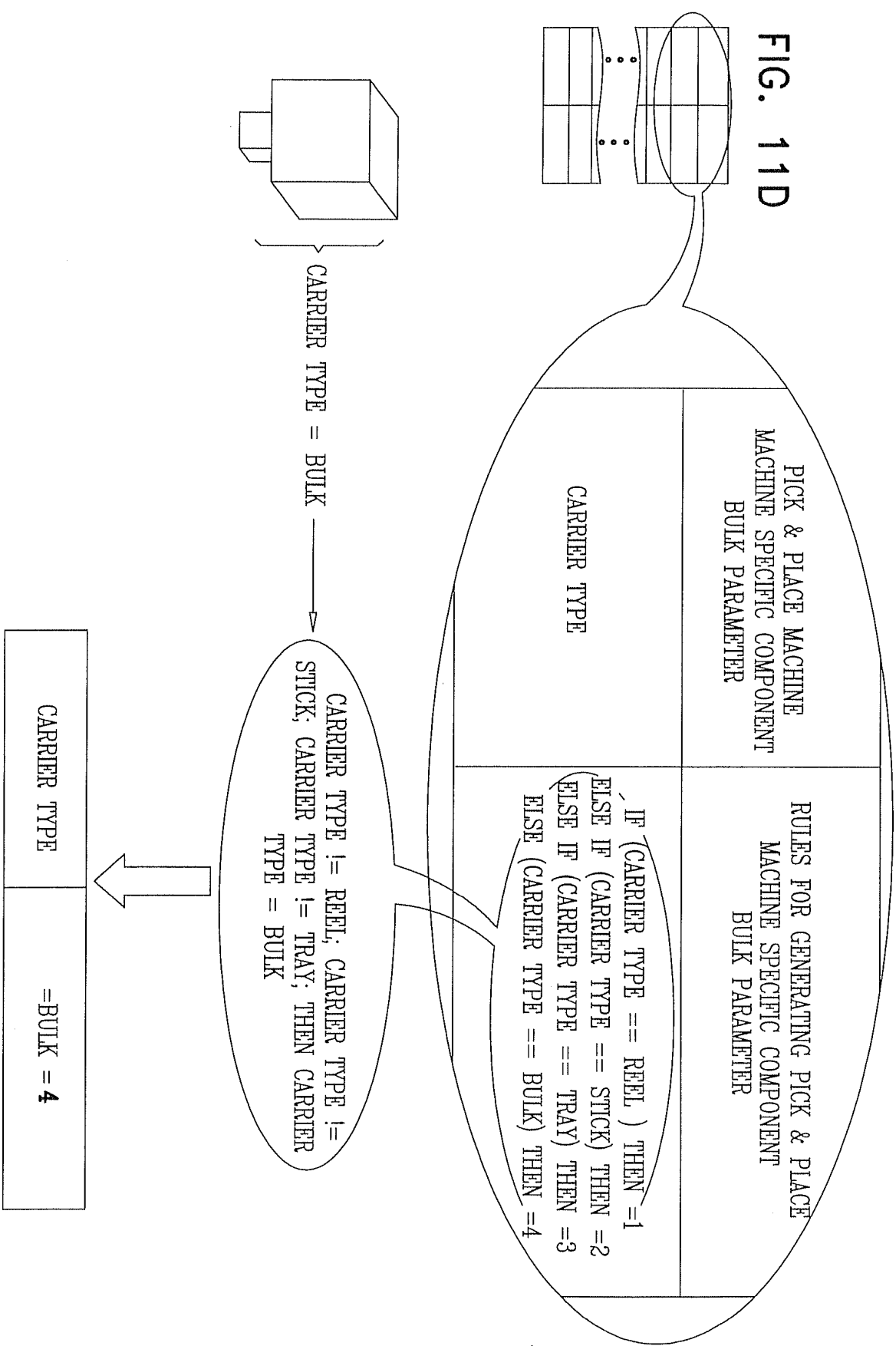


FIG. 12

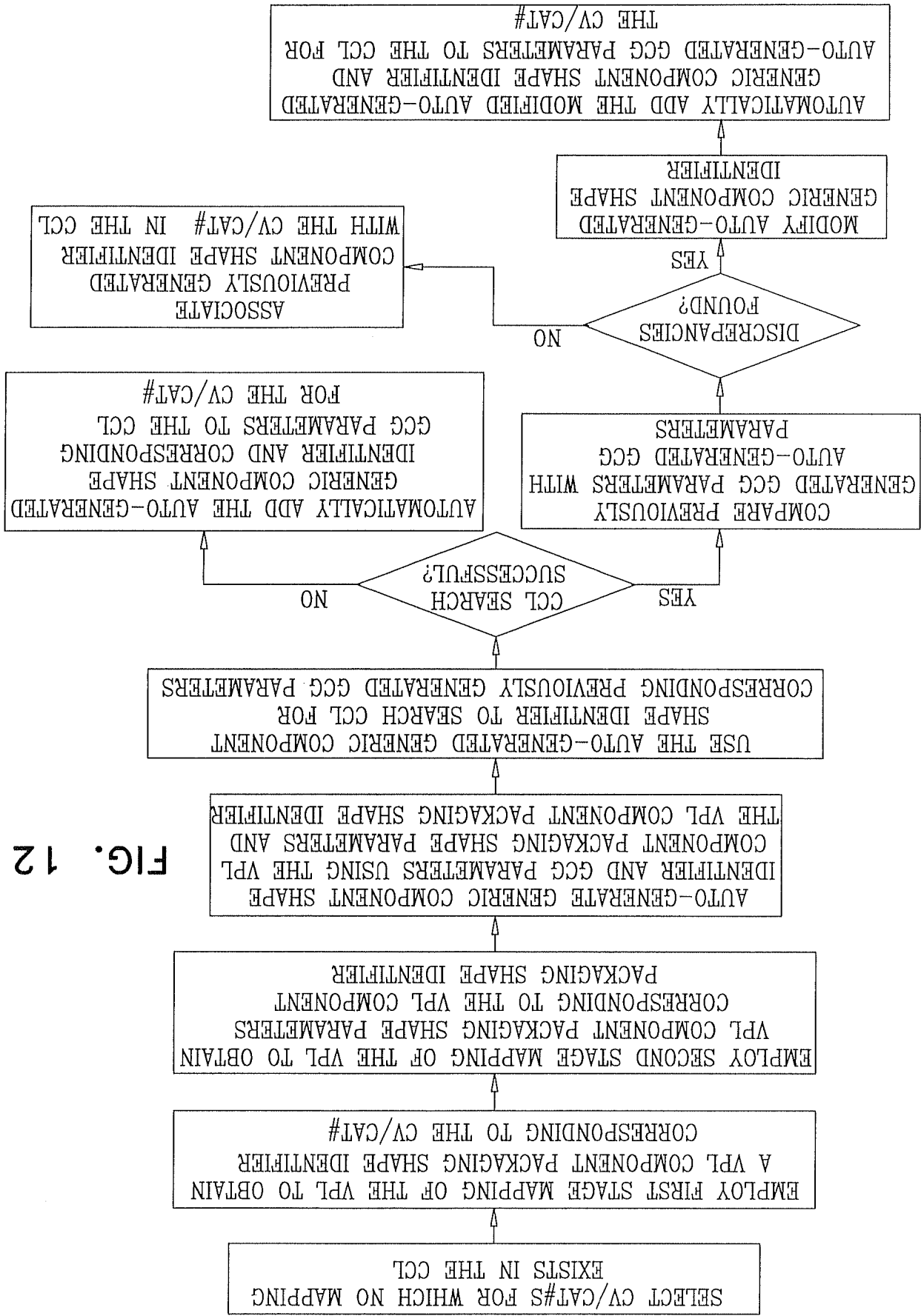
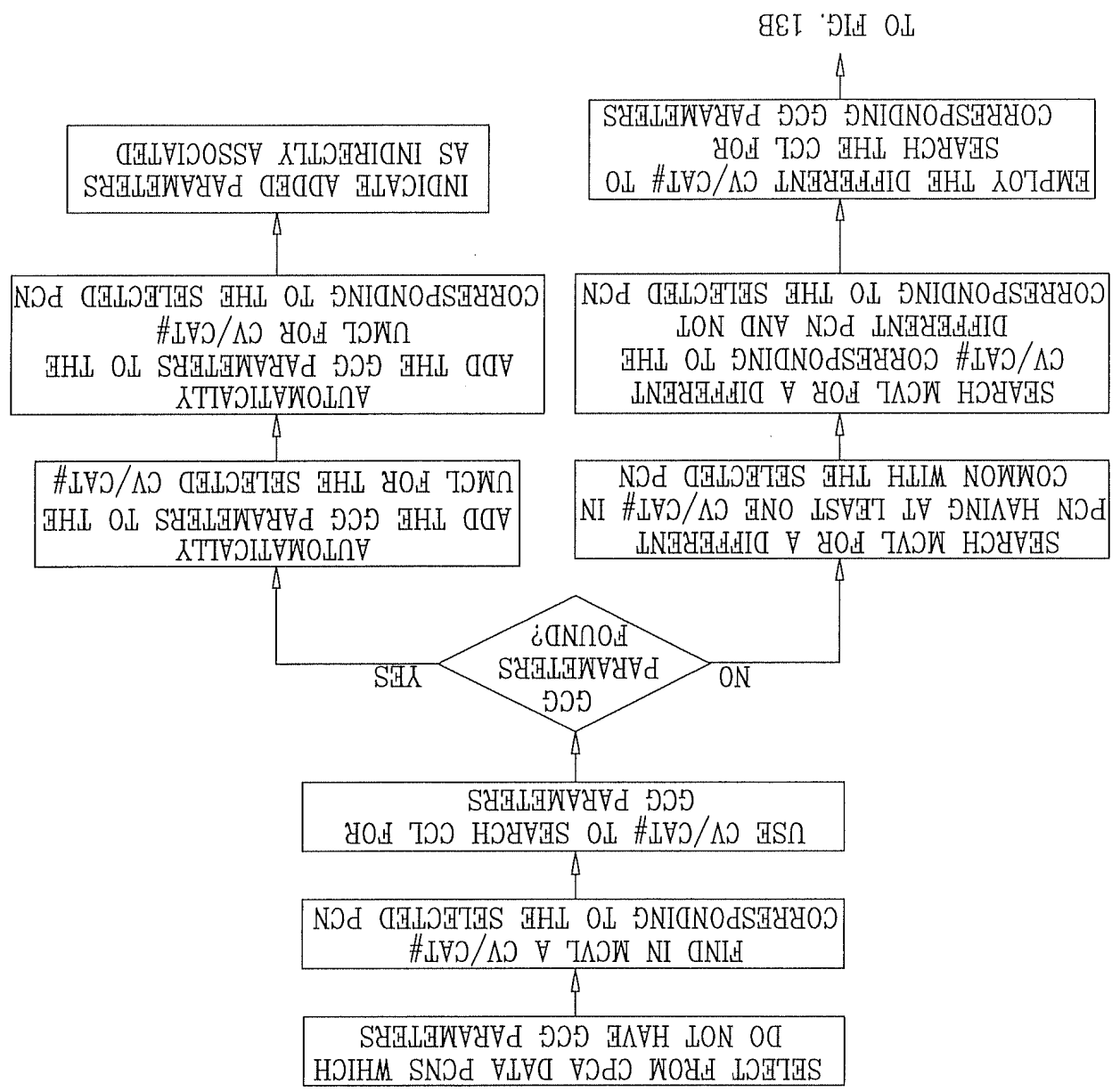
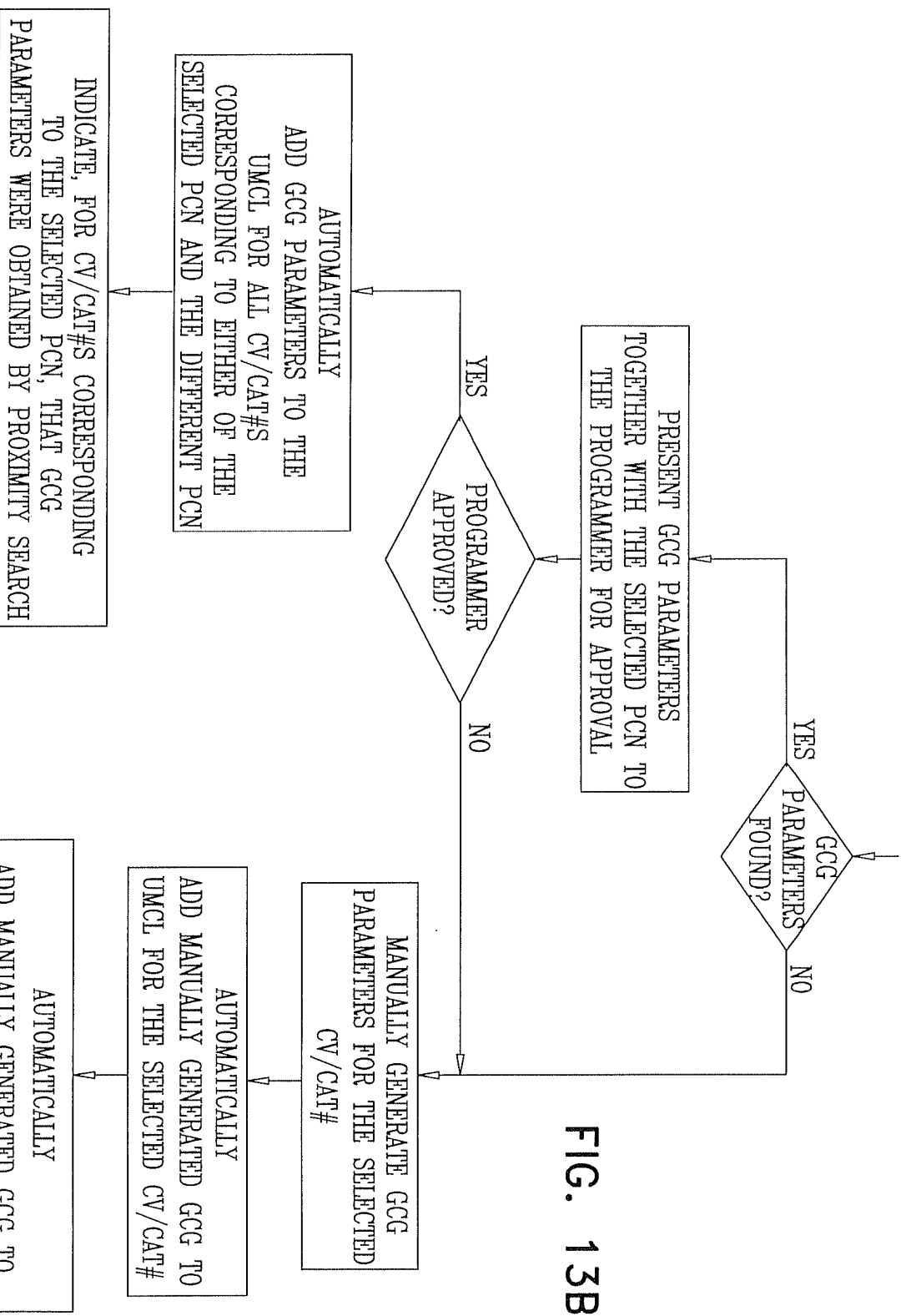


FIG. 13A



FROM FIG. 13A



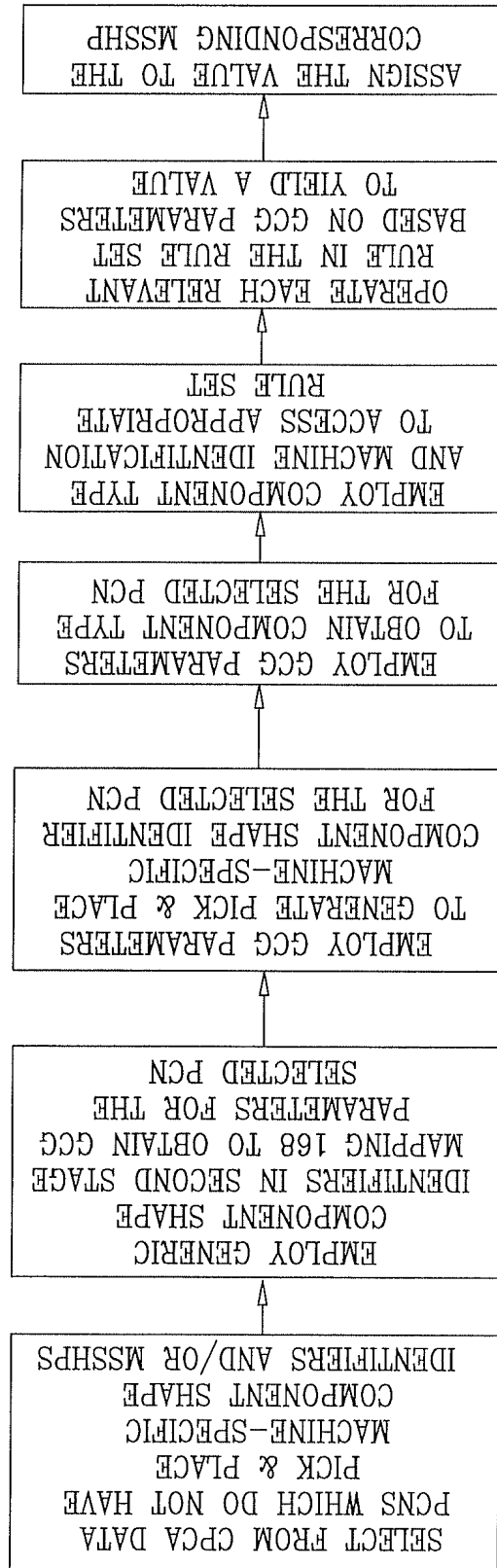


FIG. 14

FIG. 15A

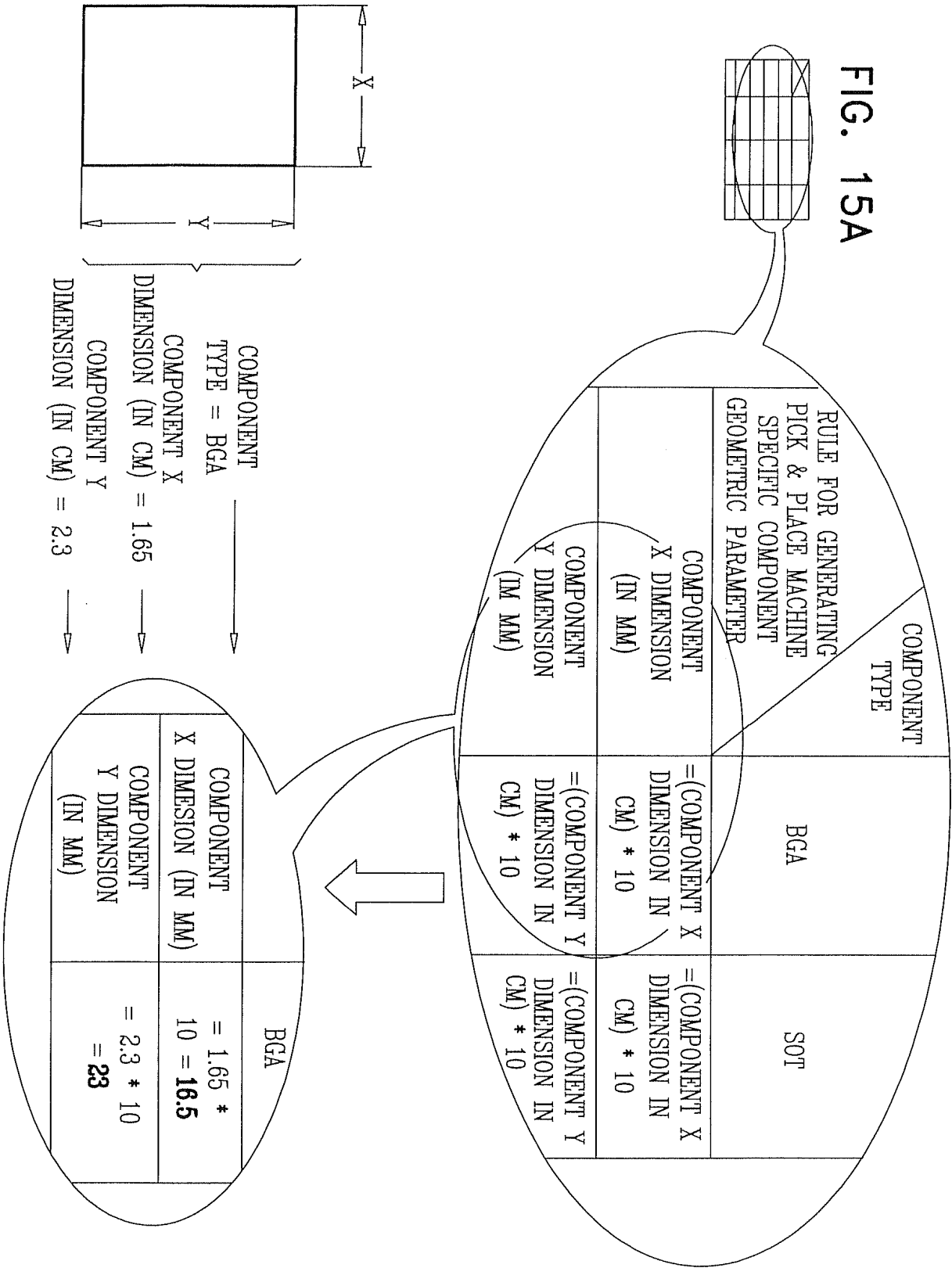


FIG. 15B

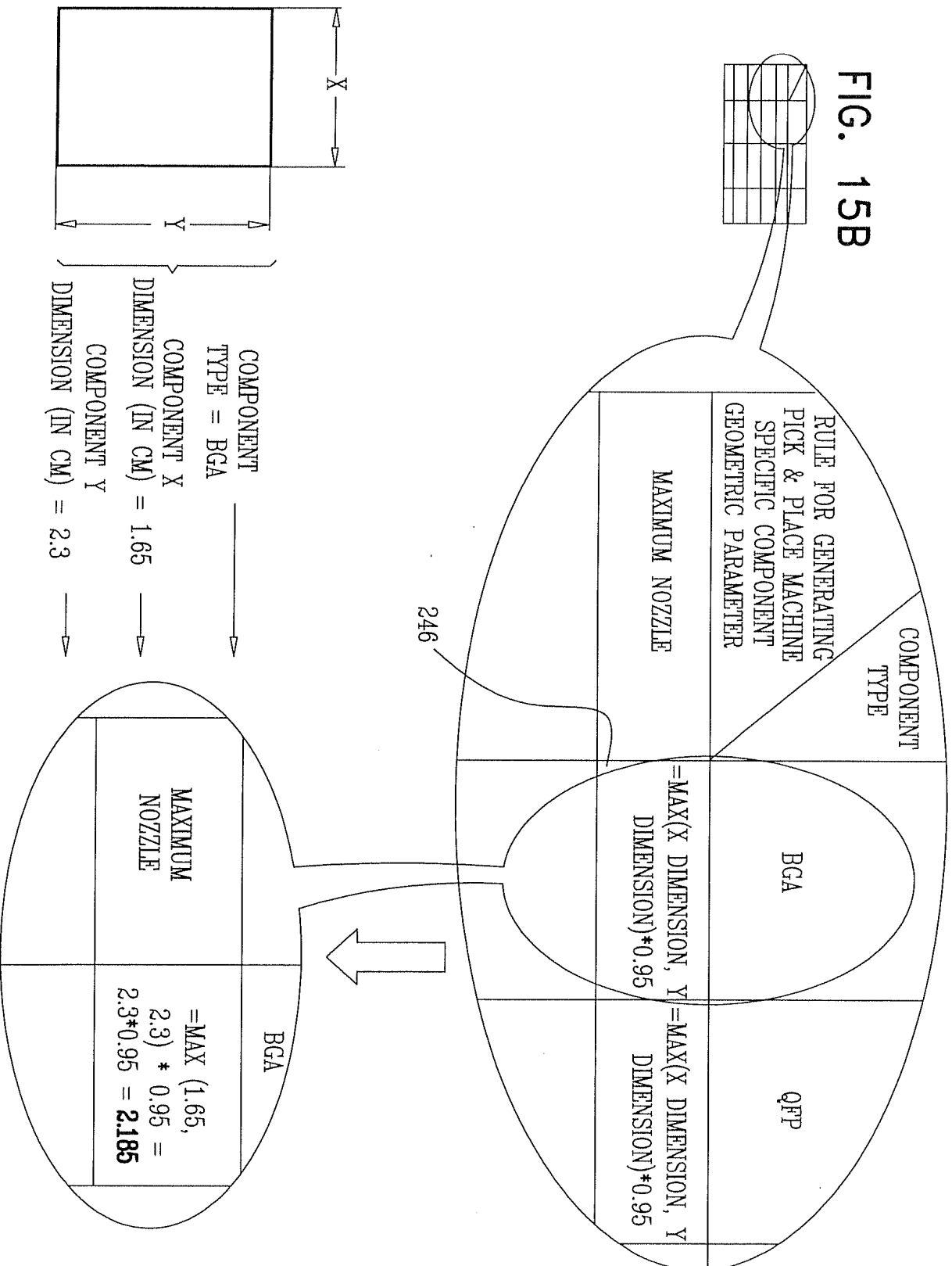


FIG. 15C

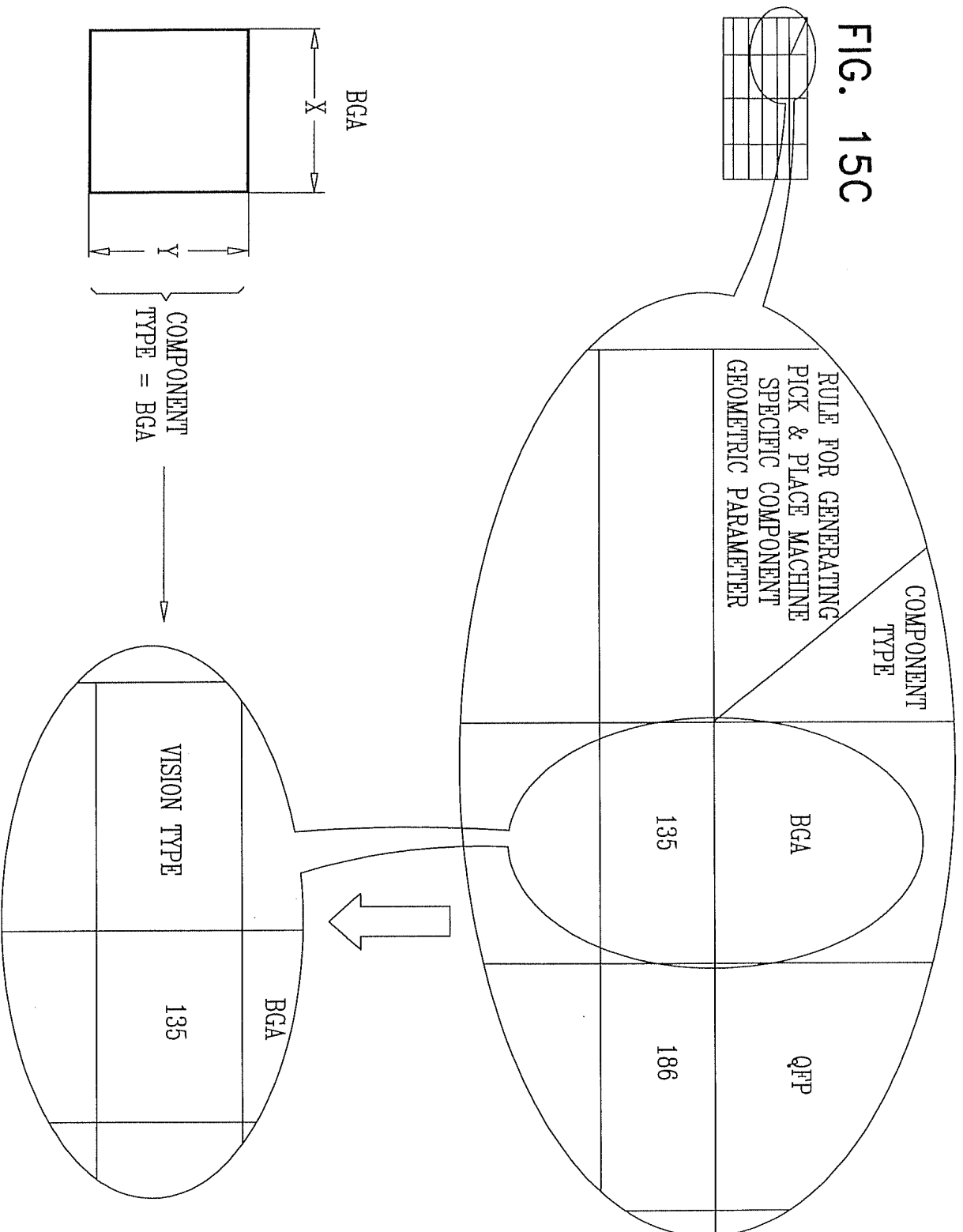
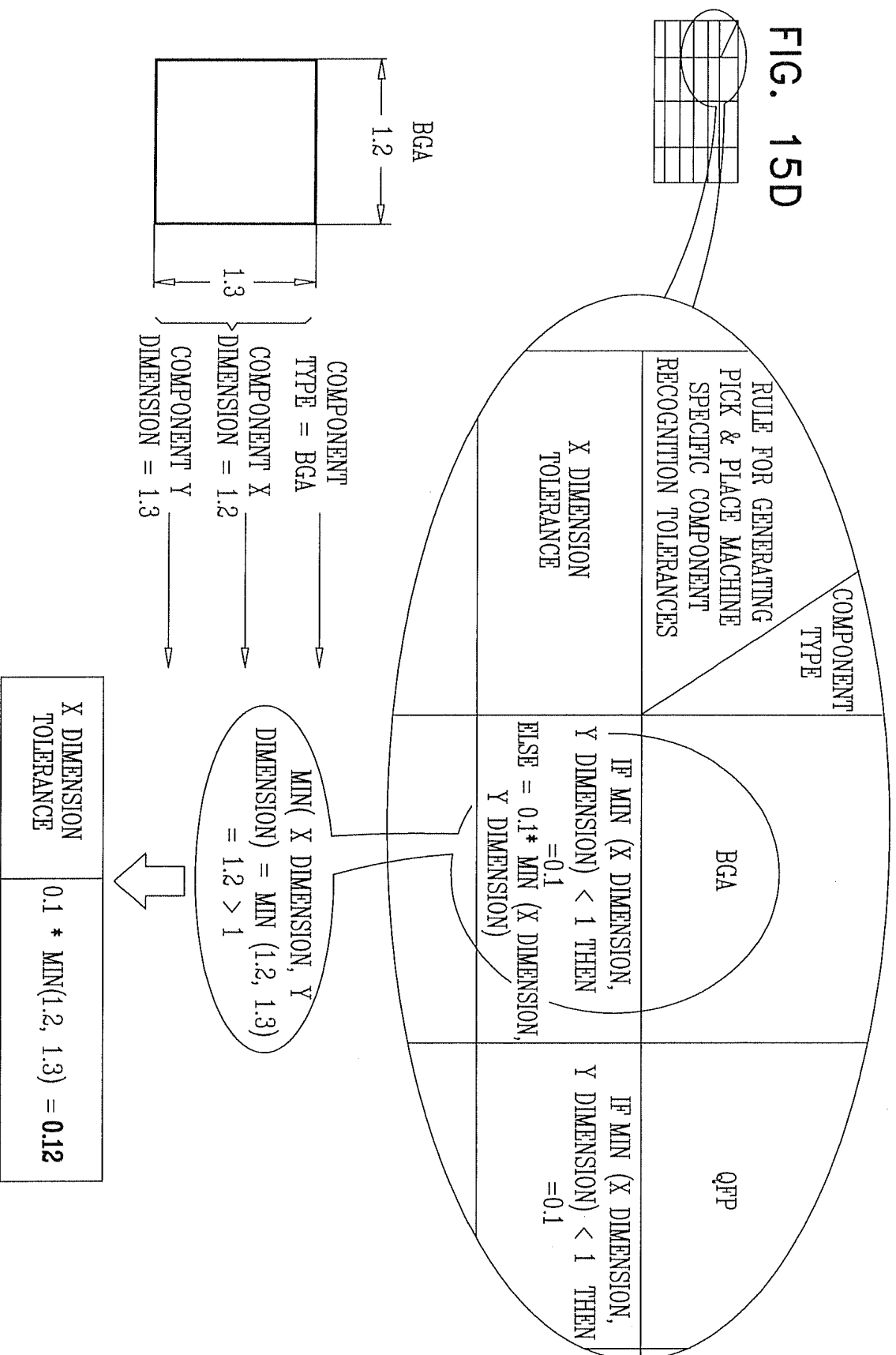
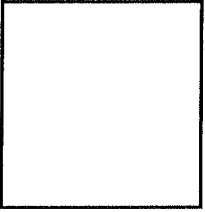


FIG. 15D



A 5x5 grid of squares. A circle is drawn, centered on the intersection of the second vertical line from the left and the second horizontal line from the top. The circle's radius is 1.5 grid units. A line segment starts at the top-right corner of the grid (intersection of the 5th vertical and 5th horizontal lines) and extends diagonally down and to the left, passing through the intersection of the 4th vertical and 4th horizontal lines, and ending at the intersection of the 3rd vertical and 3rd horizontal lines.



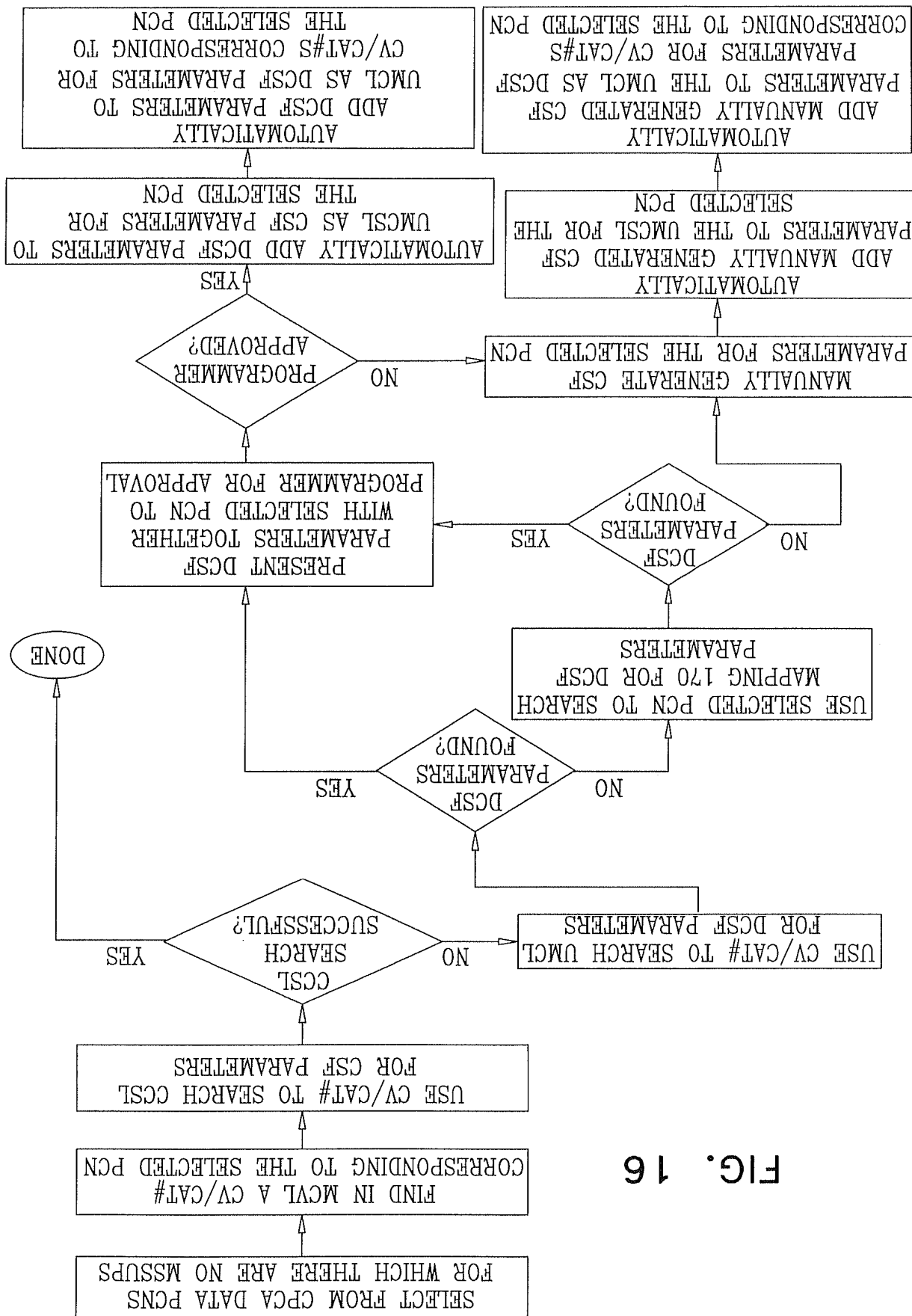
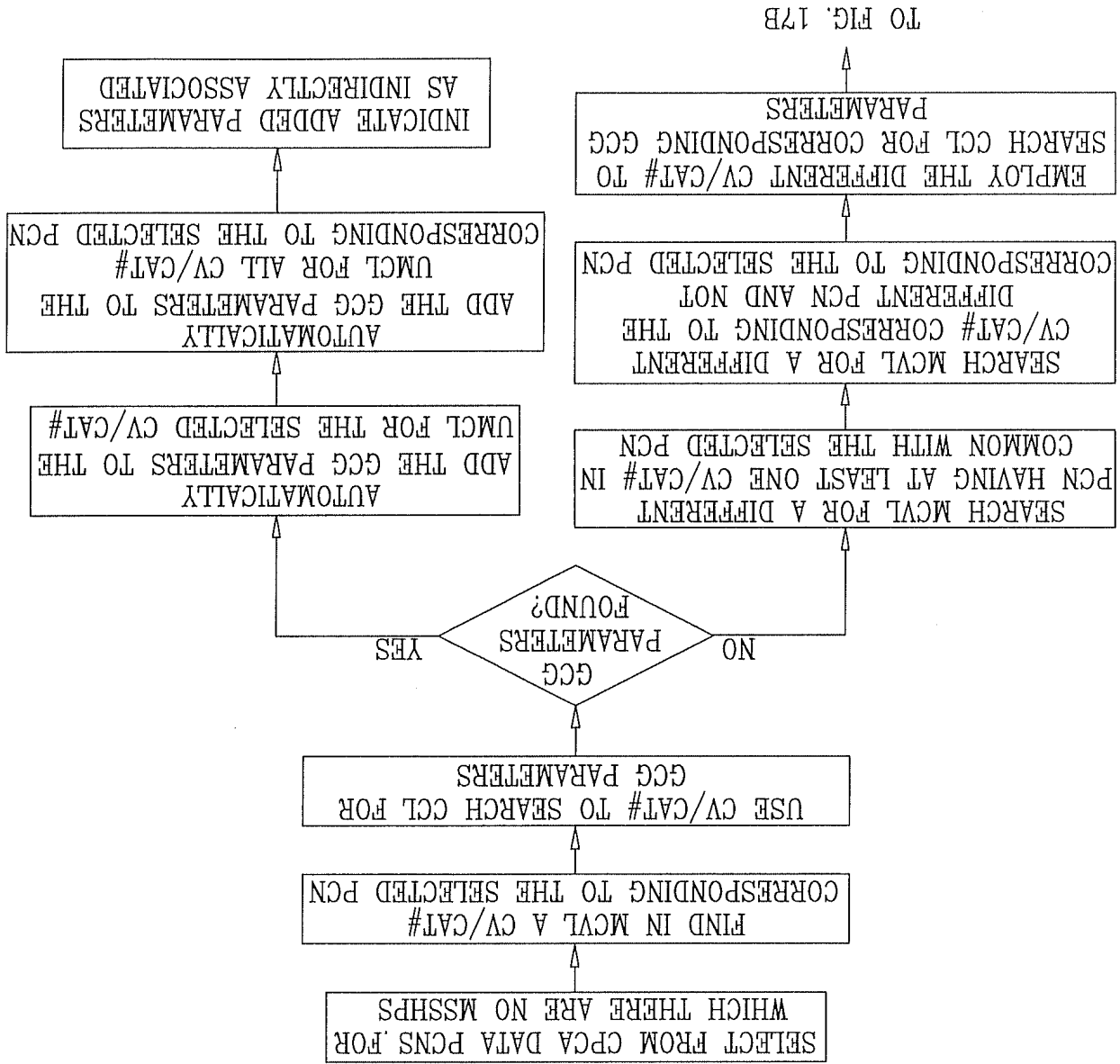


FIG. 16

FIG. 17A



FROM FIG. 17A

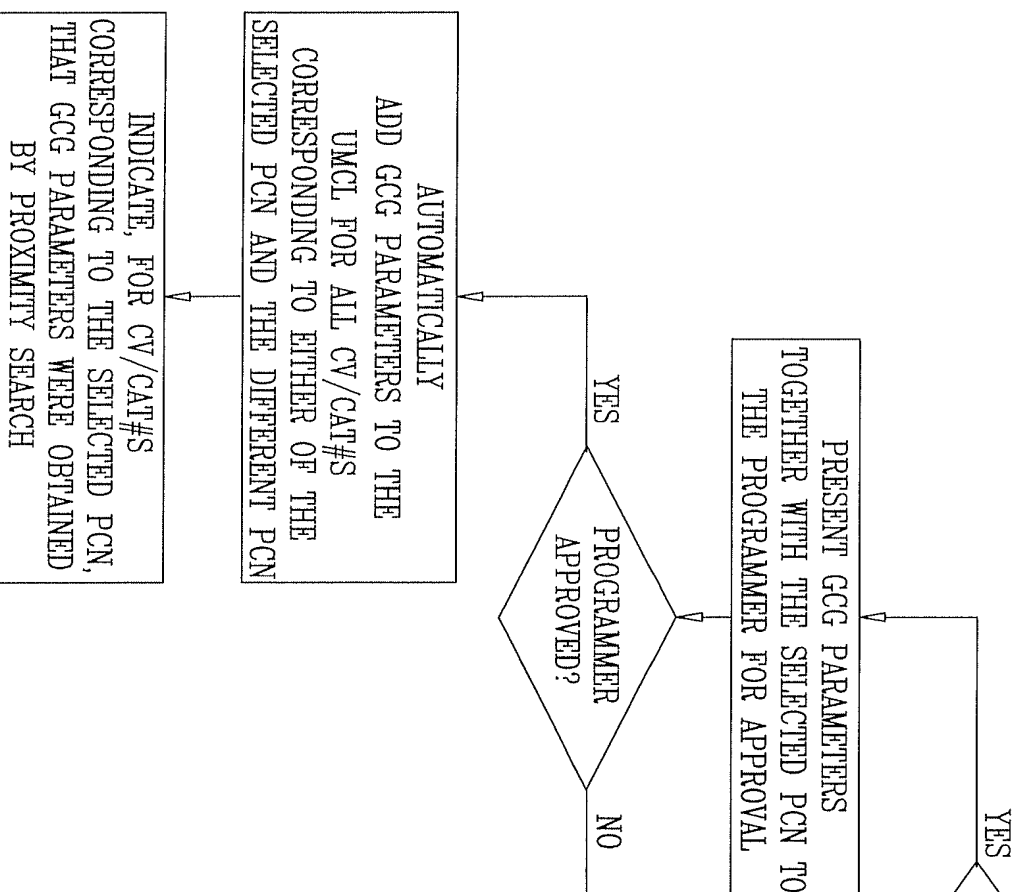


FIG. 17B

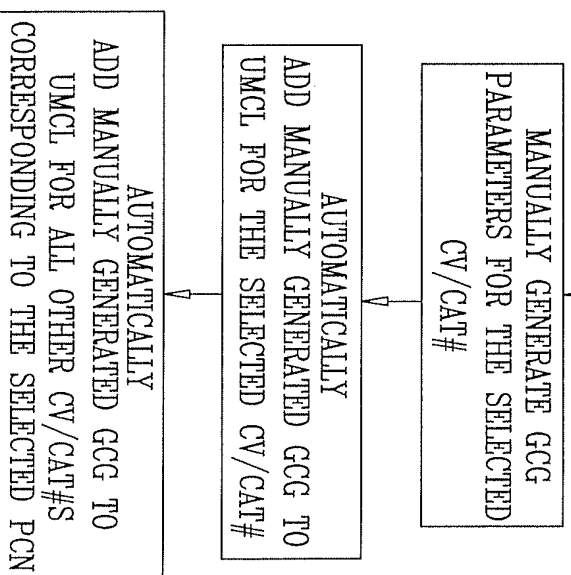
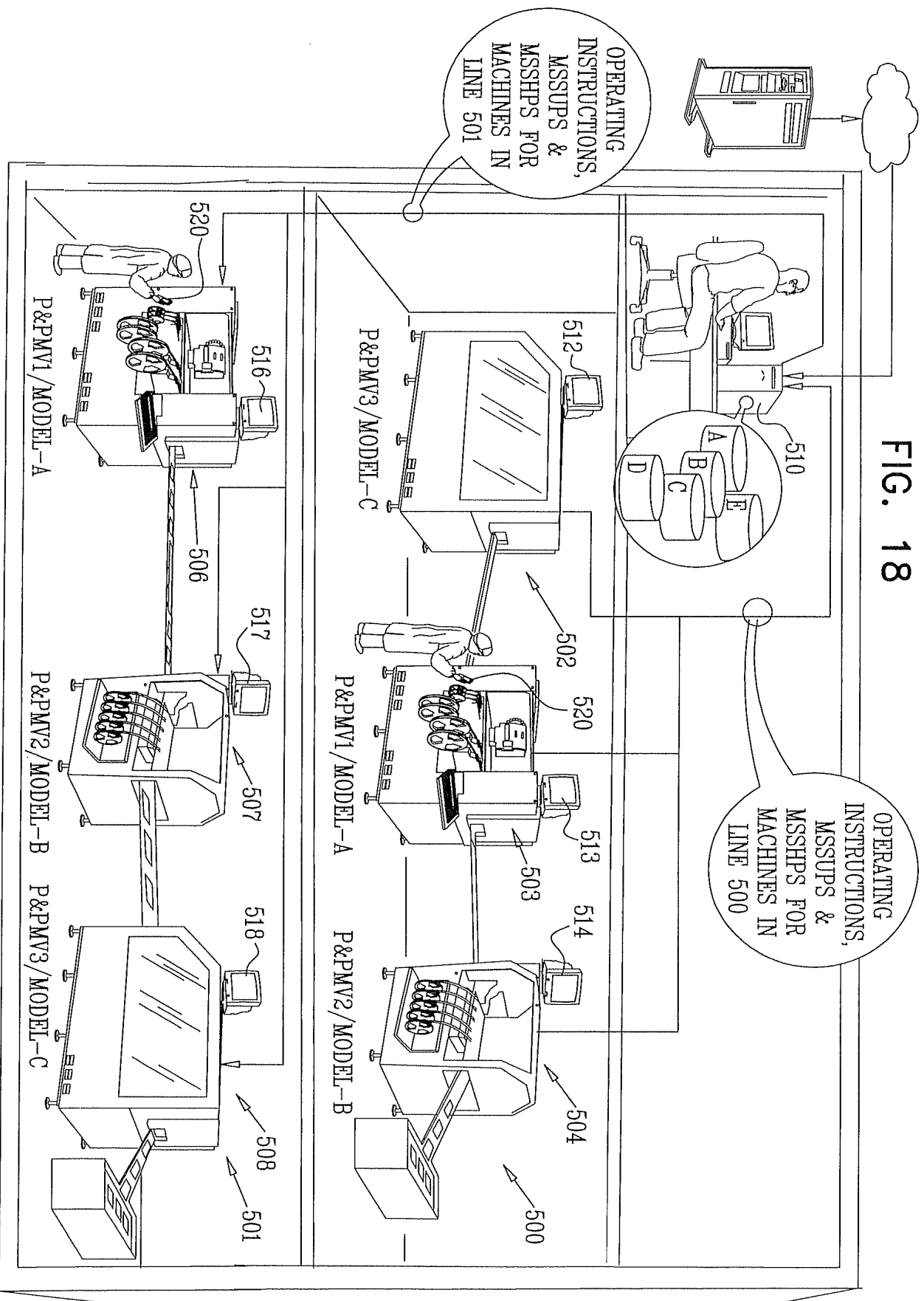


FIG. 18



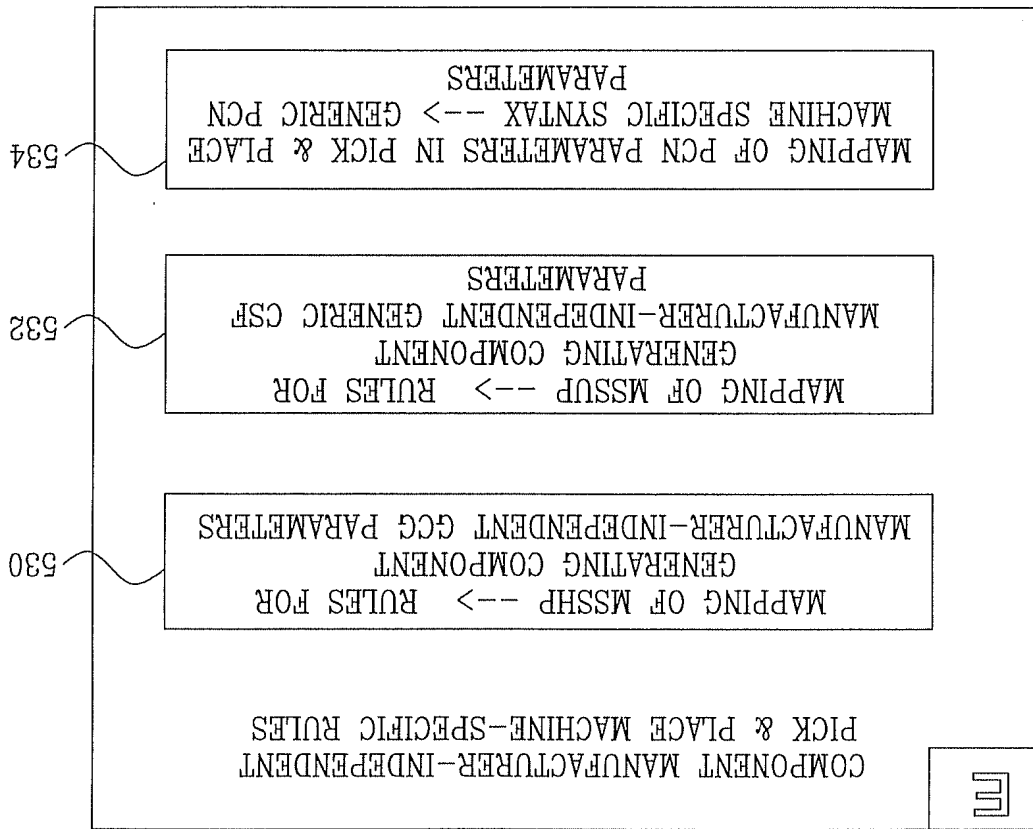


FIG. 19

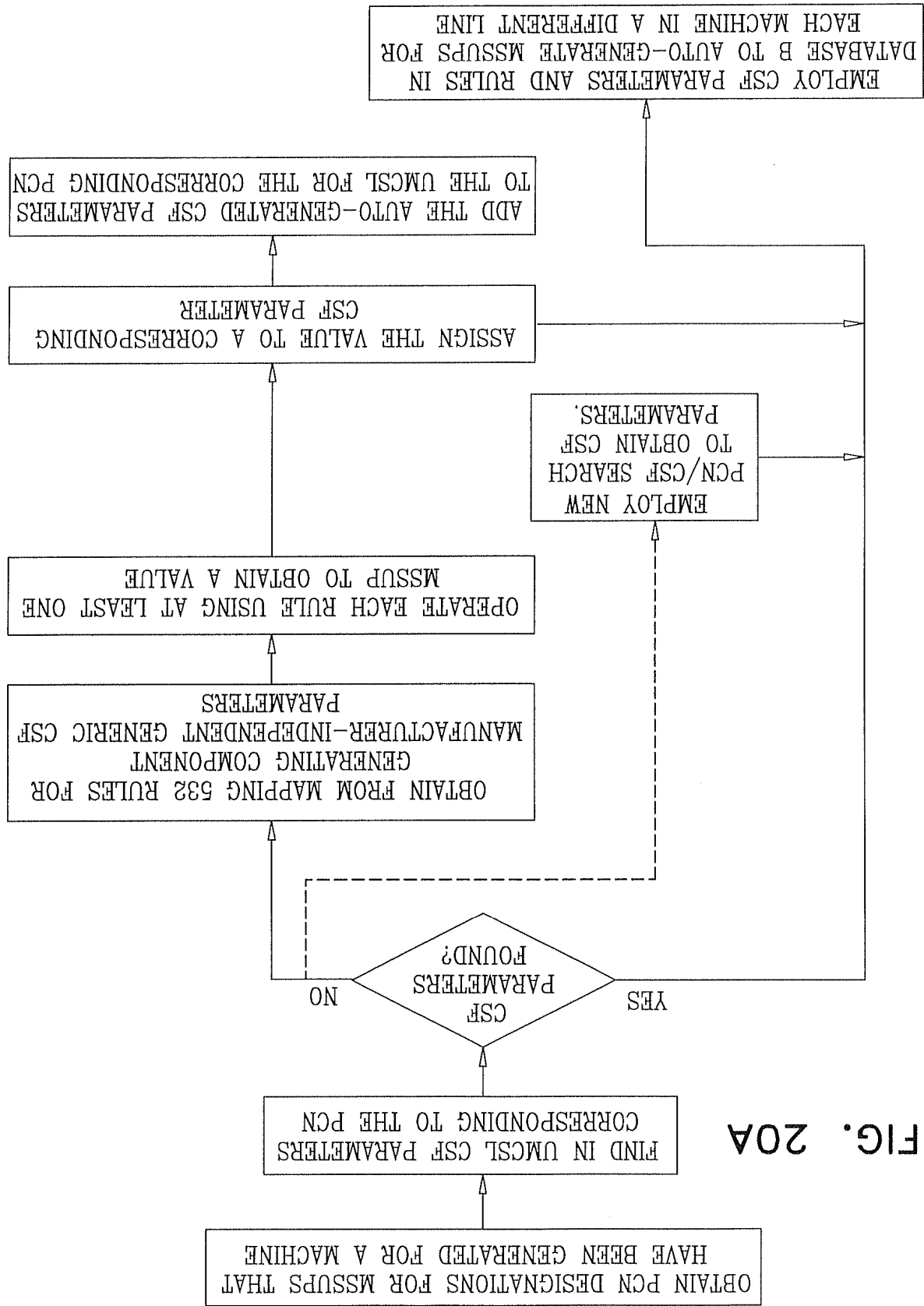


FIG. 20B

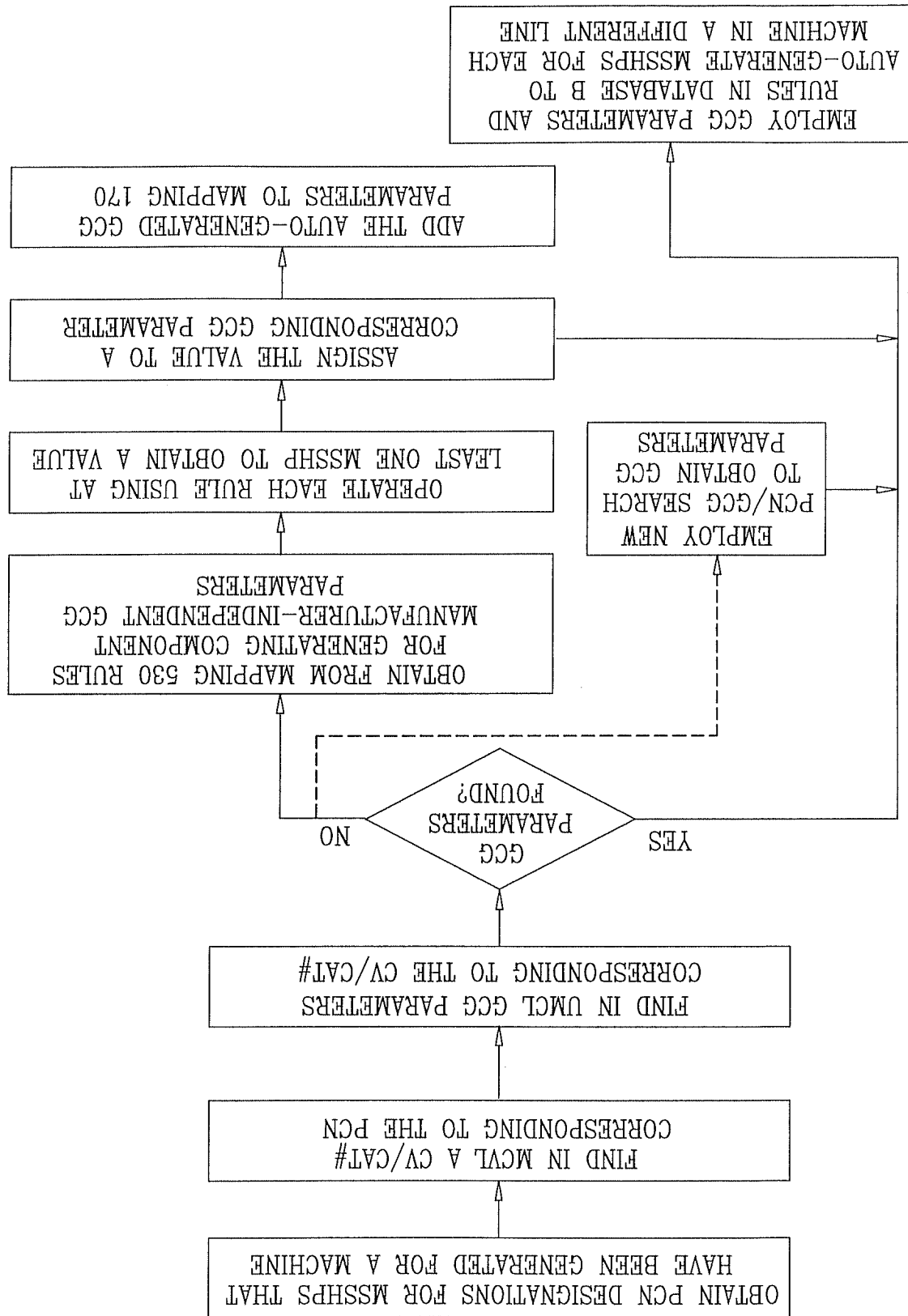
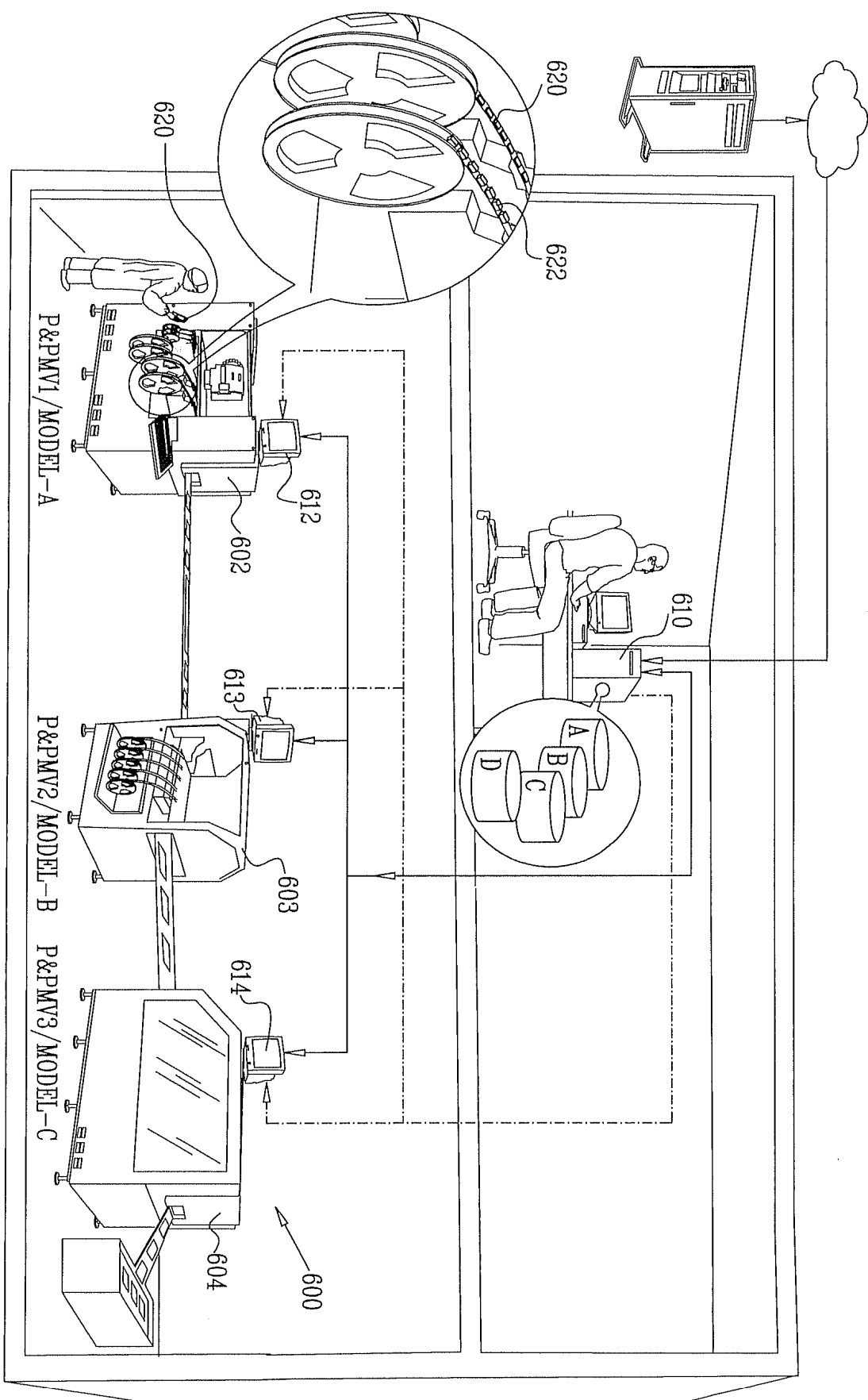


FIG. 21



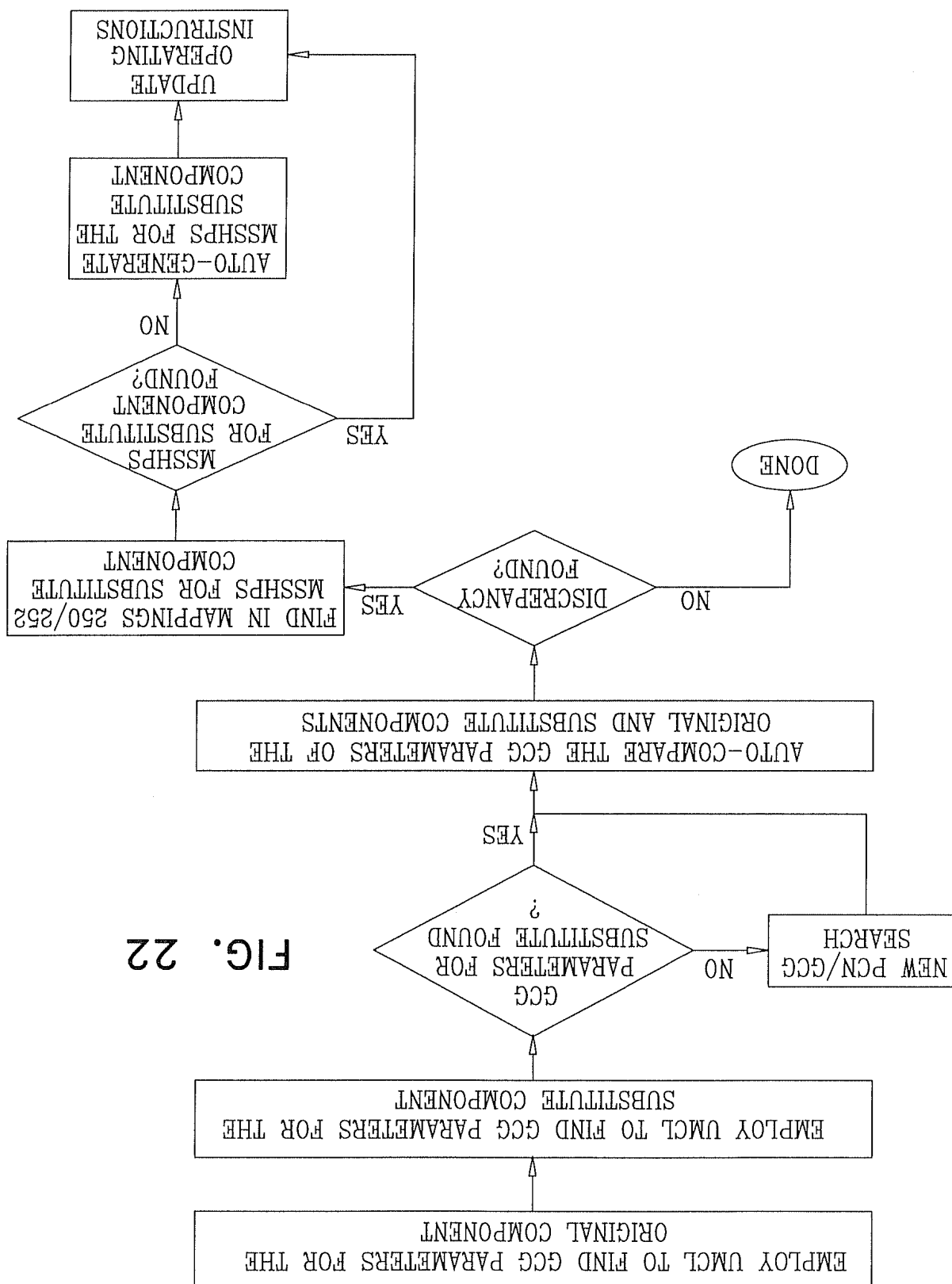


FIG. 22

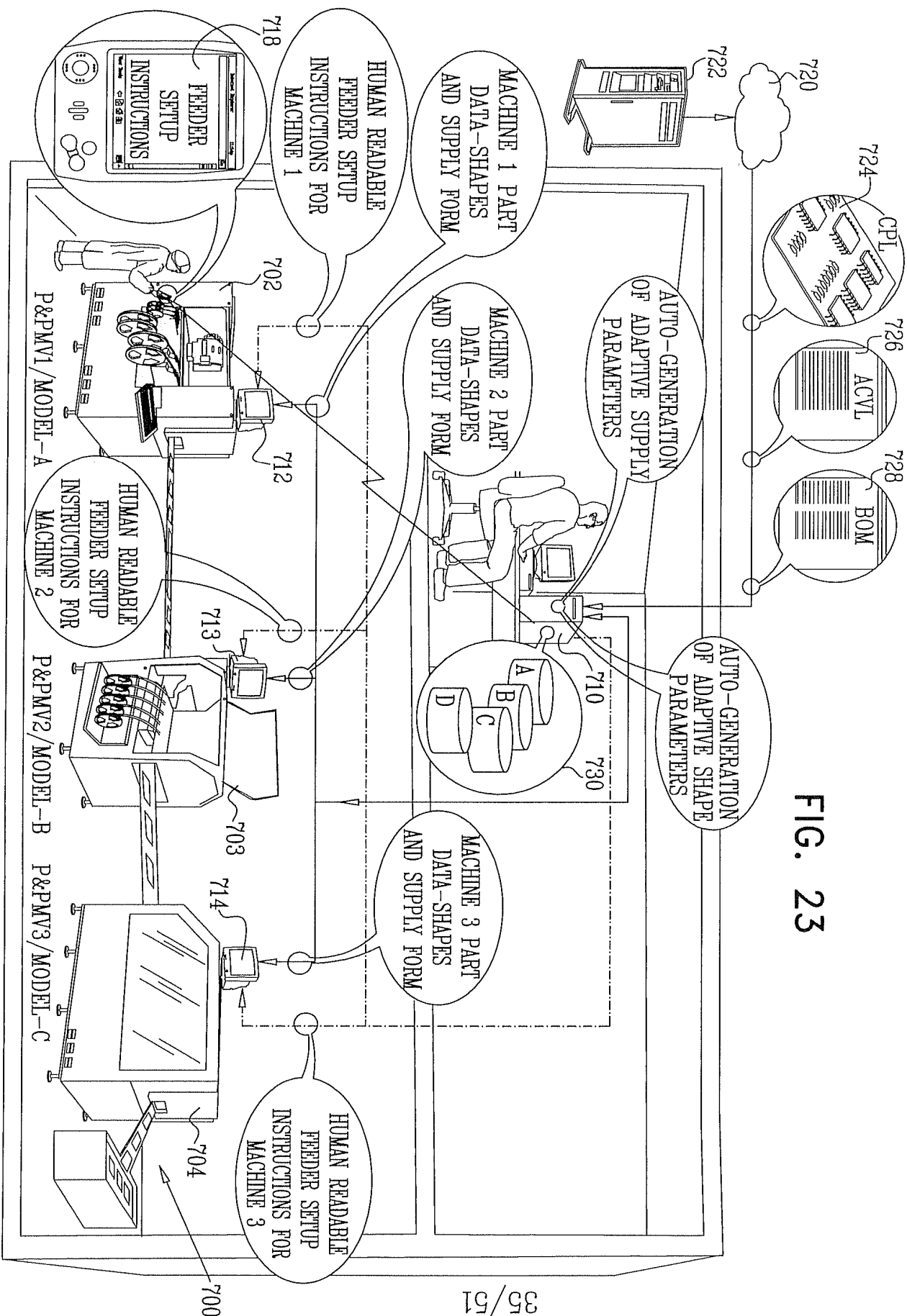


FIG. 23

FIG. 24

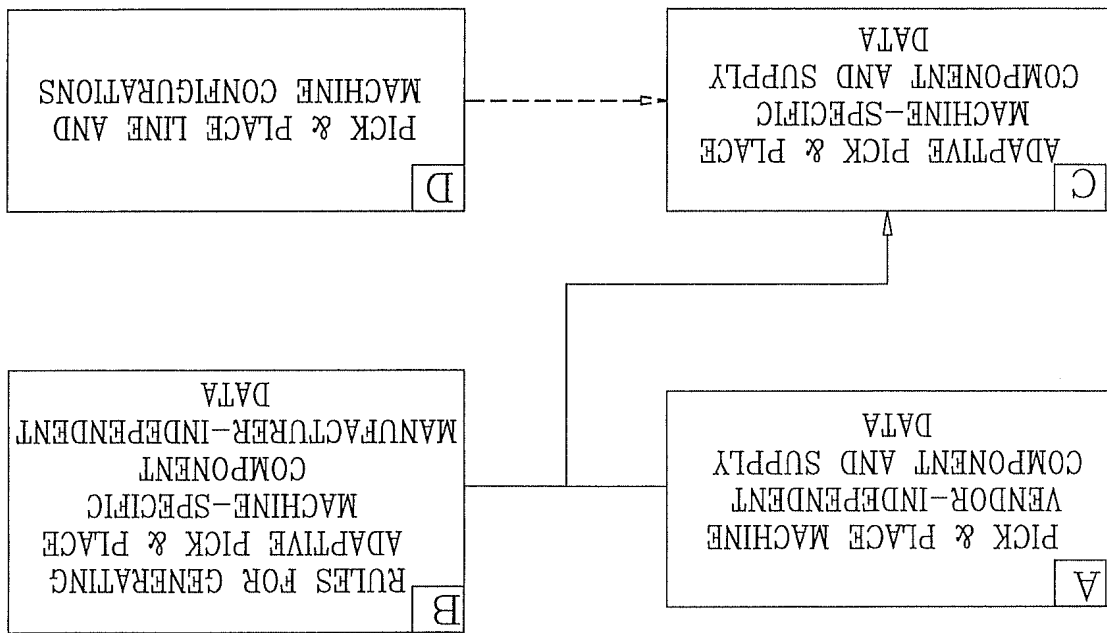


FIG. 25

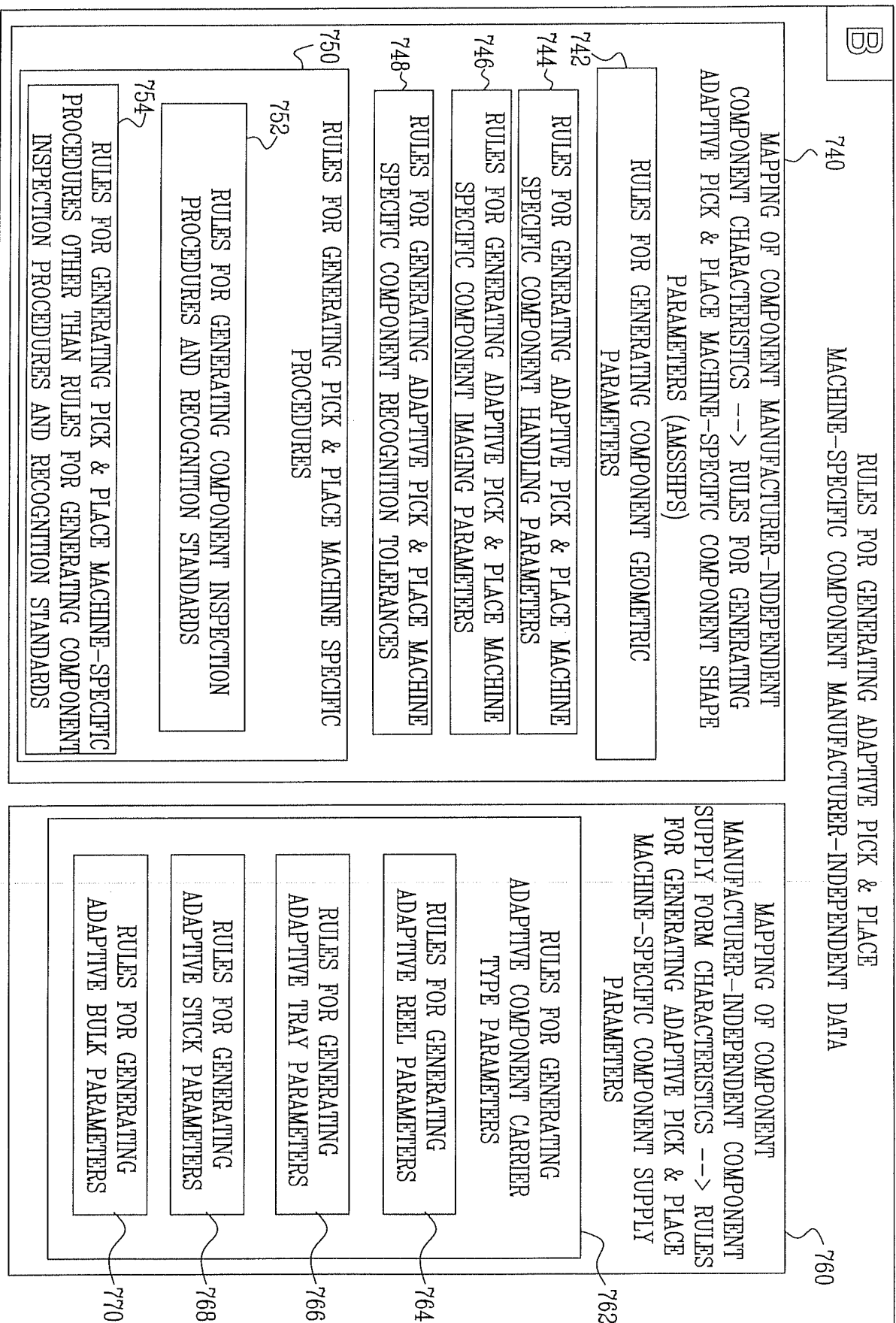


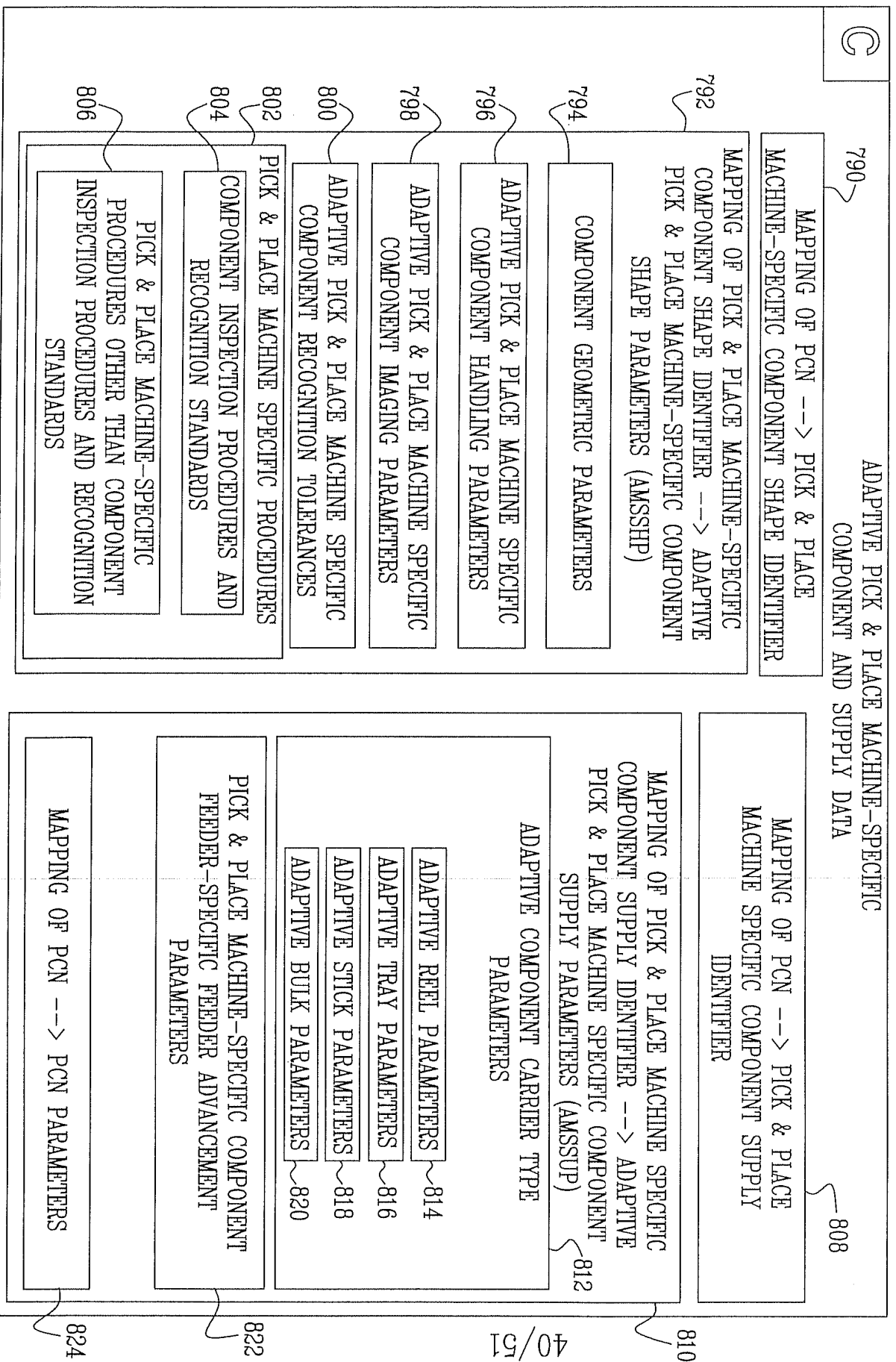
FIG. 26A

PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER	RULES FOR GENERATING ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT TRAY PARAMETER
FEEDER NAME	TRAY LIFTER: IF { FRONT TRAY LIFTER} THEN =NAME A ELSE THEN =NAME B
• • •	• • •

FIG. 26B

ADAPTIVE PICK & PLACE MACHINE SPECIFIC COMPONENT SHAPE PARAMETER	COMPONENT MANUFACTURER-INDEPENDENT COMPONENT CHARACTERISTIC (COMPONENT TYPE)	BGA 782	QFP 784	CONNECTOR 786
VISION ALGORITHM		FOR BACKLIGHTING: IF {#LEADS > 100} THEN NOT RELEVANT ELSE =105 FOR FRONTLIGHTING: =103	FOR BACKLIGHTING: NOT RELEVANT FOR FRONTLIGHTING: =107	IF {LEAD-PITCH < 0.01} THEN USE FRONTLIGHTING =120 ELSE USE FRONTLIGHTING =130 OR BACKLIGHTING =150
...

FIG. 27



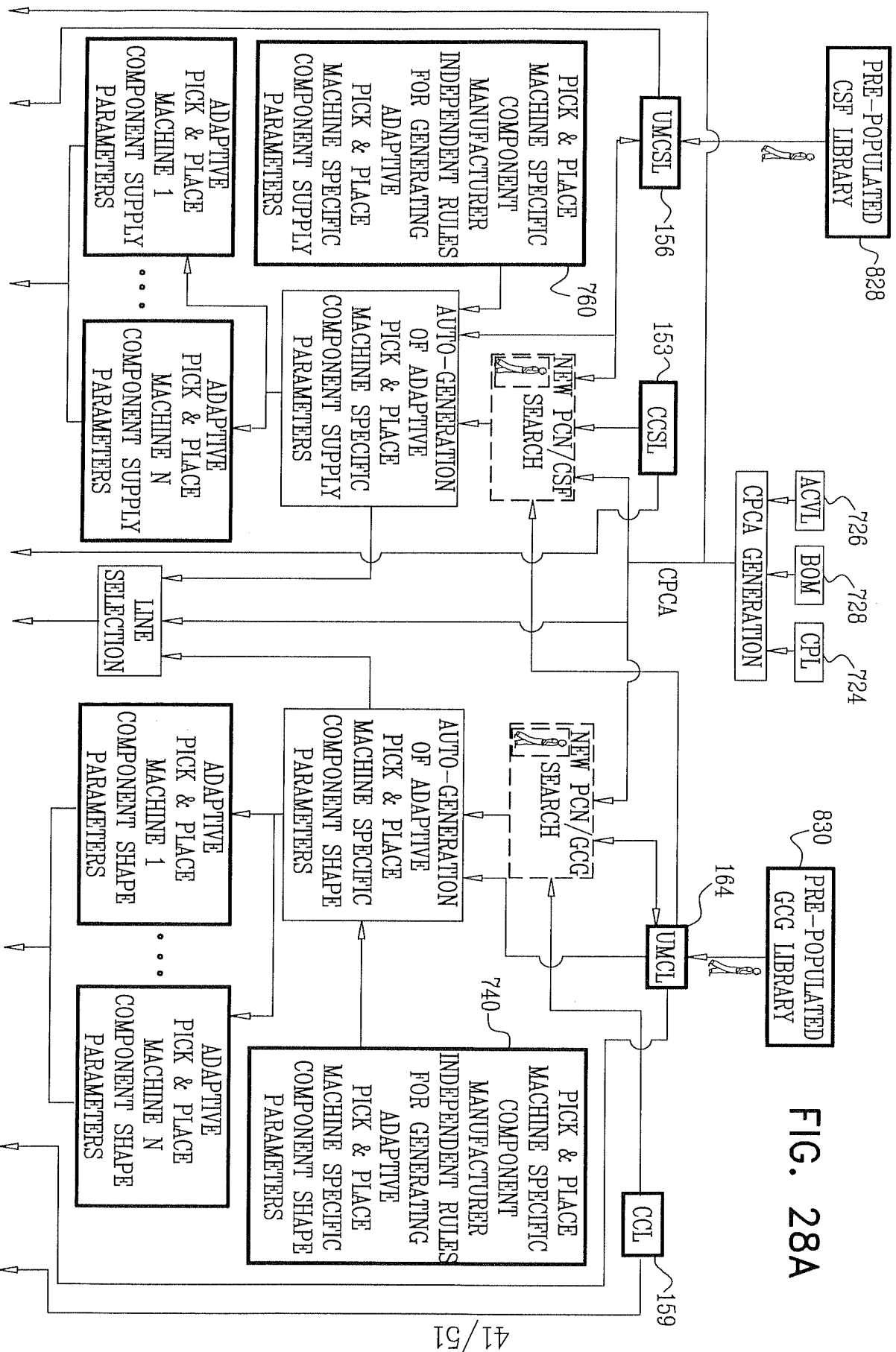


FIG. 28A

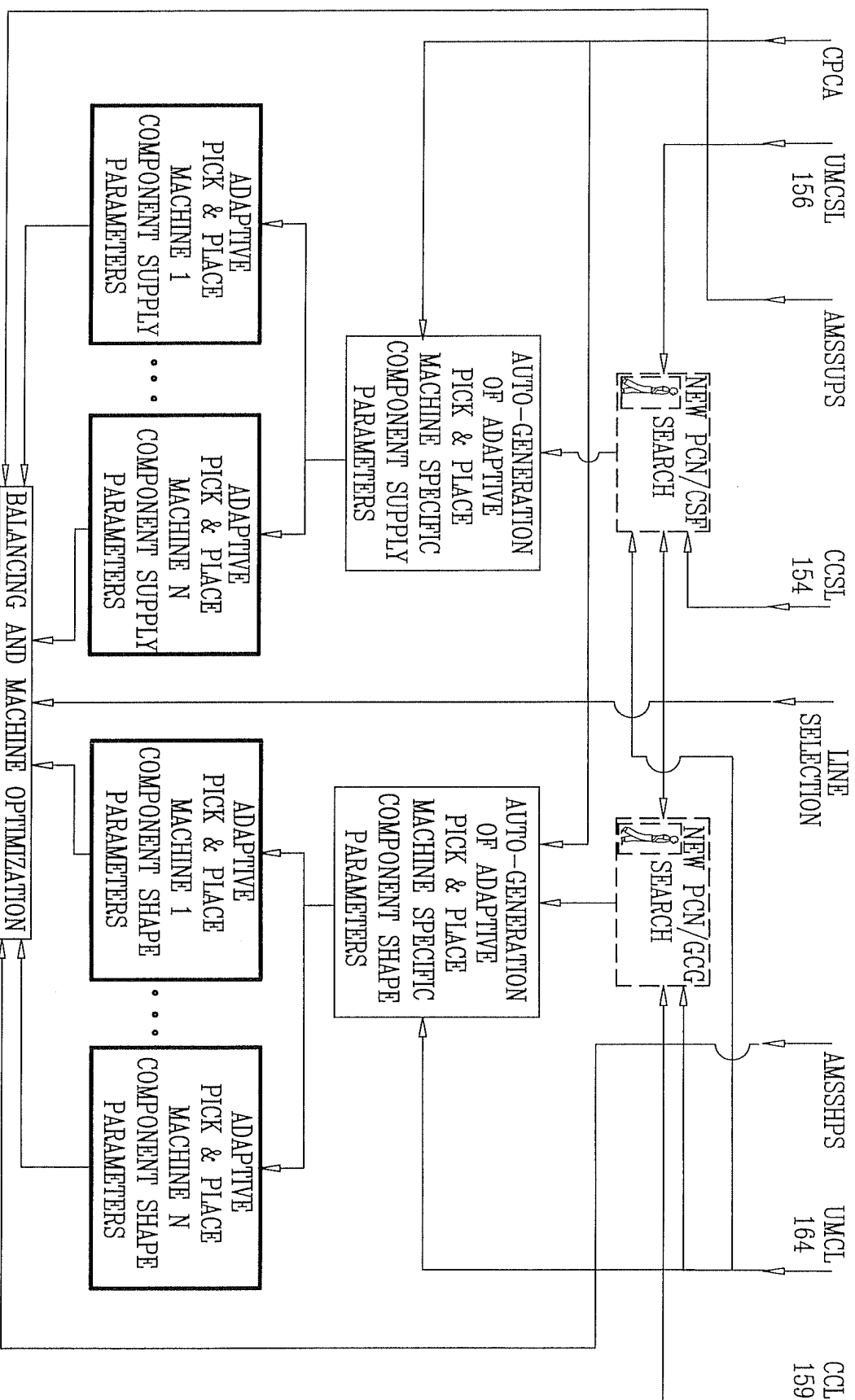


FIG. 28B

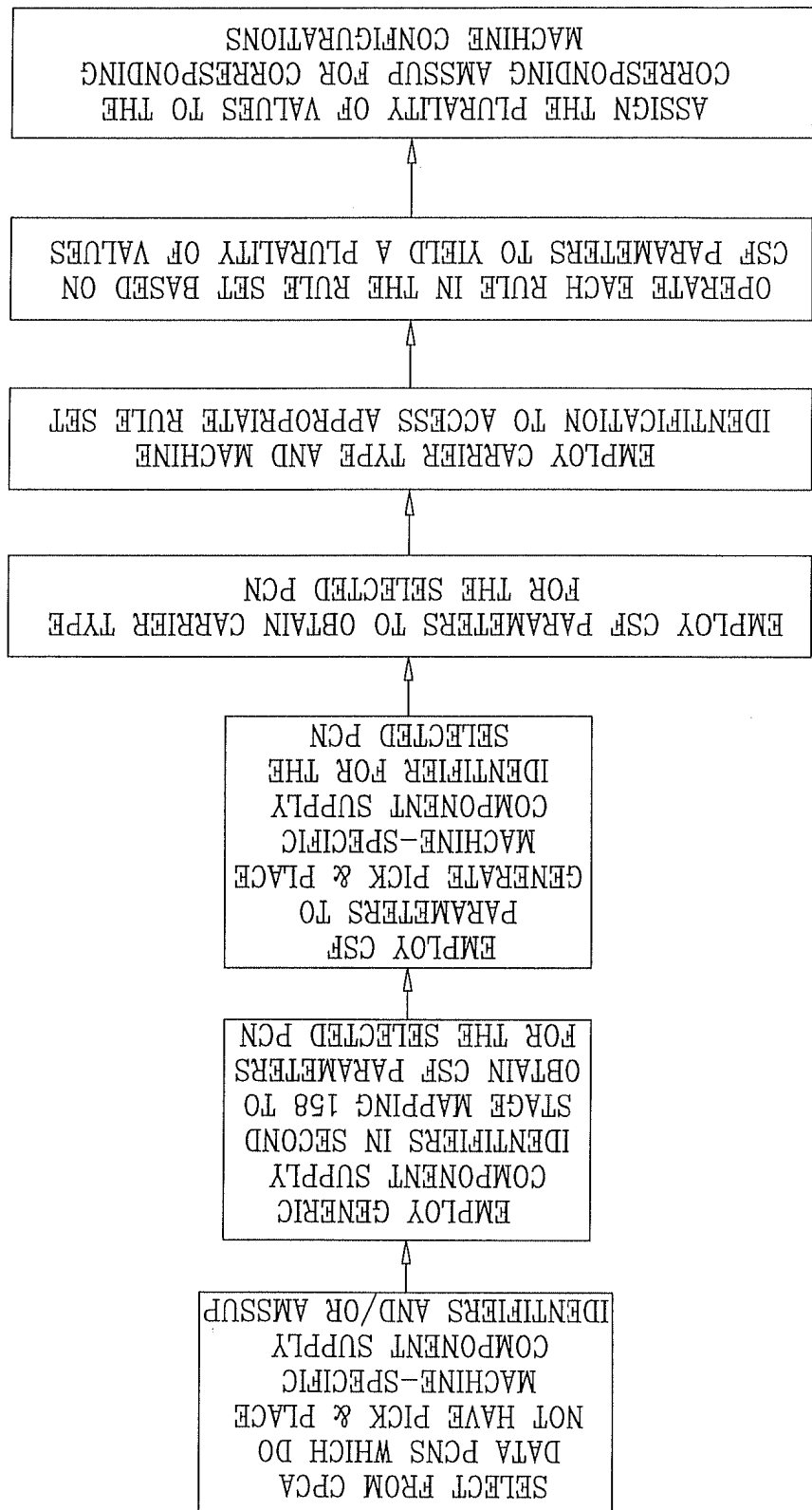
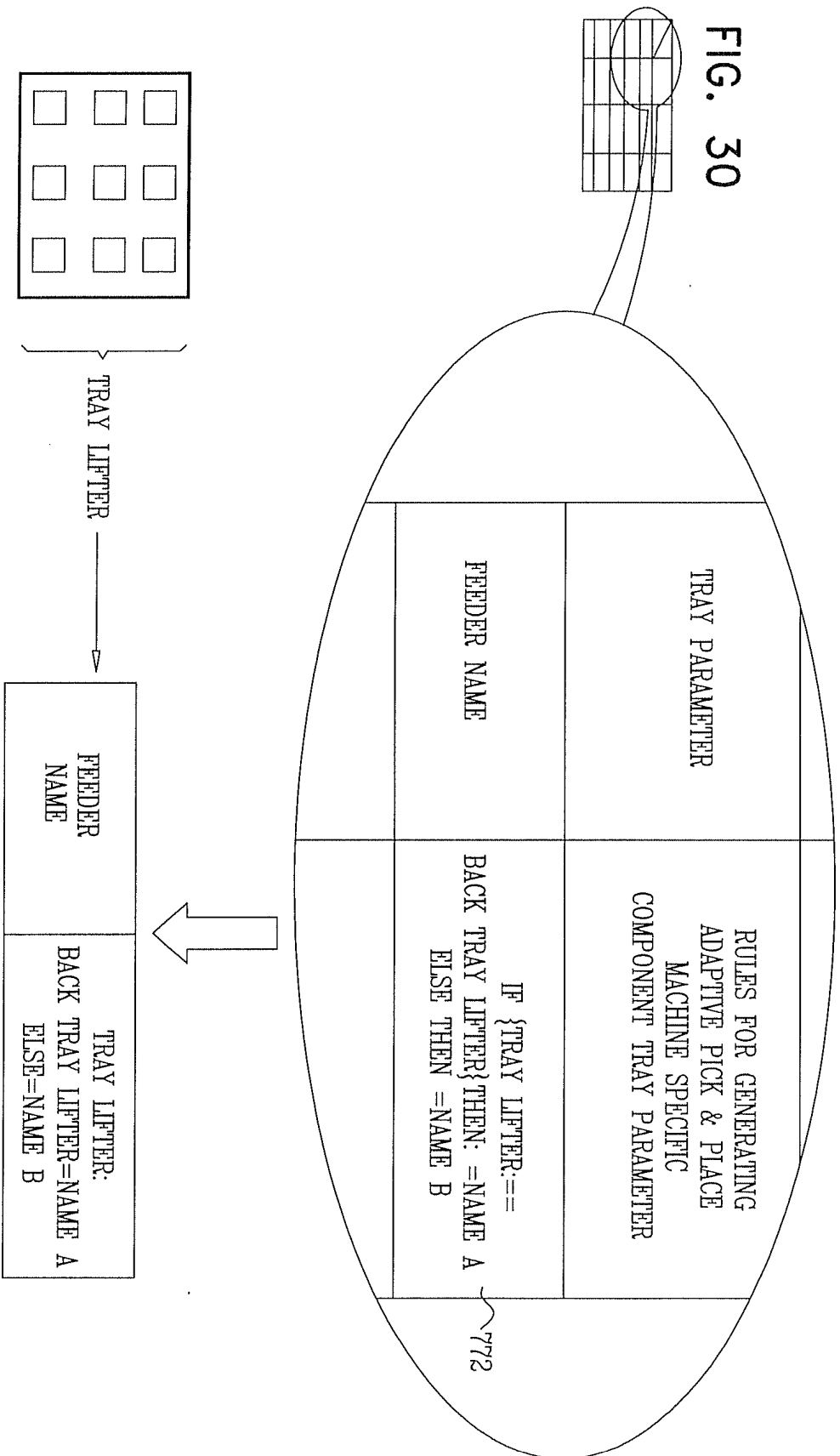


FIG. 29

FIG. 30



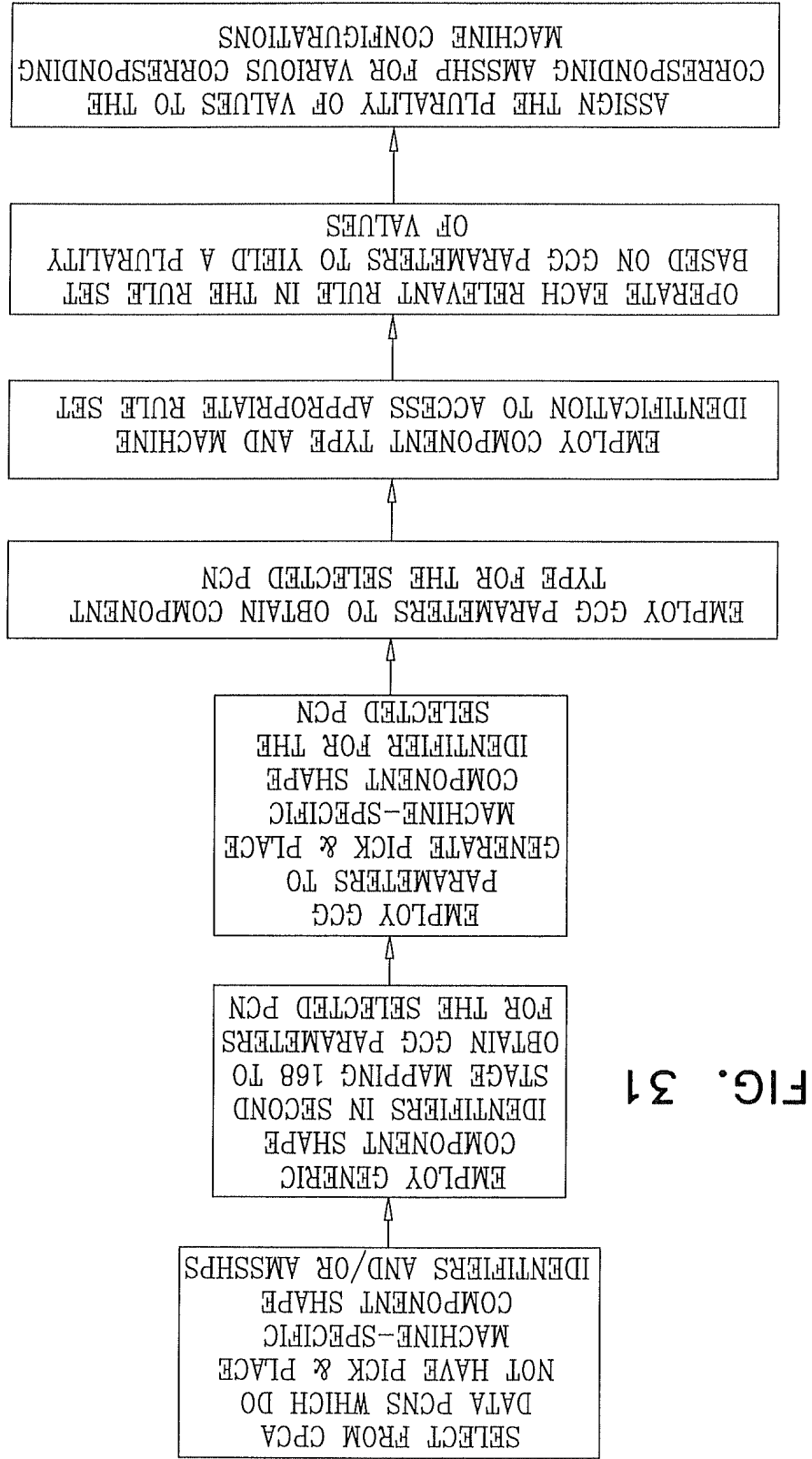
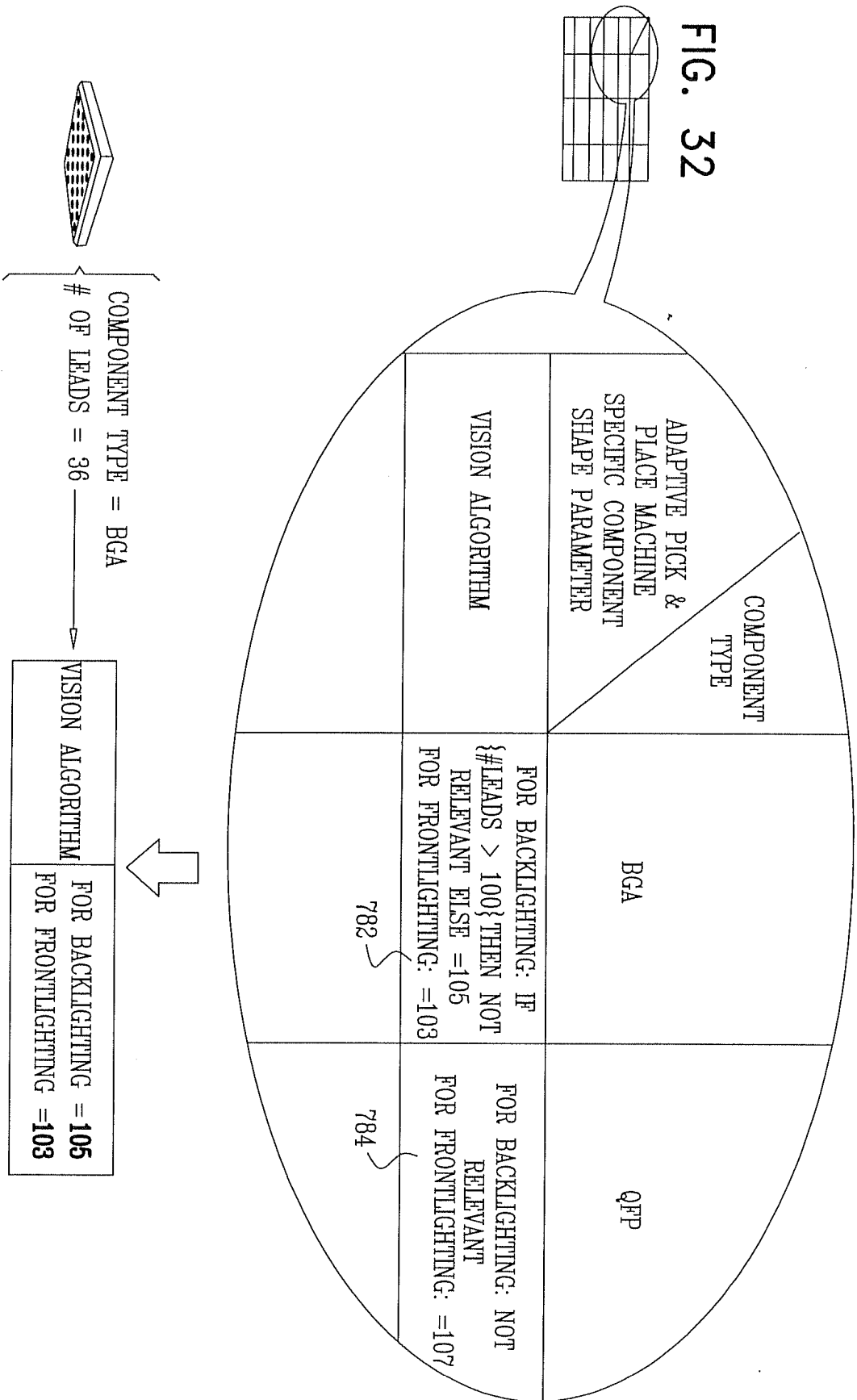


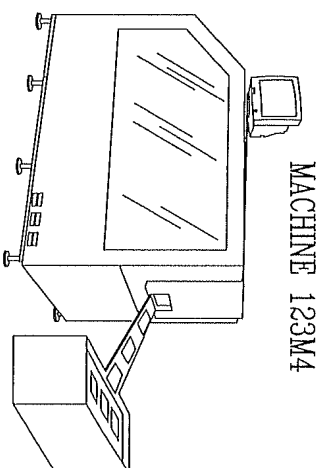
FIG. 32





COMPONENT 156SN444	
PARAMETERS FOR MACHINE 123M4	
CARRIER TYPE = TRAY	
•	
# COMPONENTS = 144	
FEEDER NAME = TRAY LIFTER: IF {FRONT TRAY LIFTER} THEN =100 ELSE THEN =200	

850



PICK & PLACE MACHINE
CONFIGURATION - FRONT TRAY LIFTER

FIG. 33

COMPONENT 156SN444	
PARAMETERS FOR MACHINE 123M4	
CARRIER TYPE = TRAY	
•	
# COMPONENTS = 144	
FEEDER NAME = 100	

852

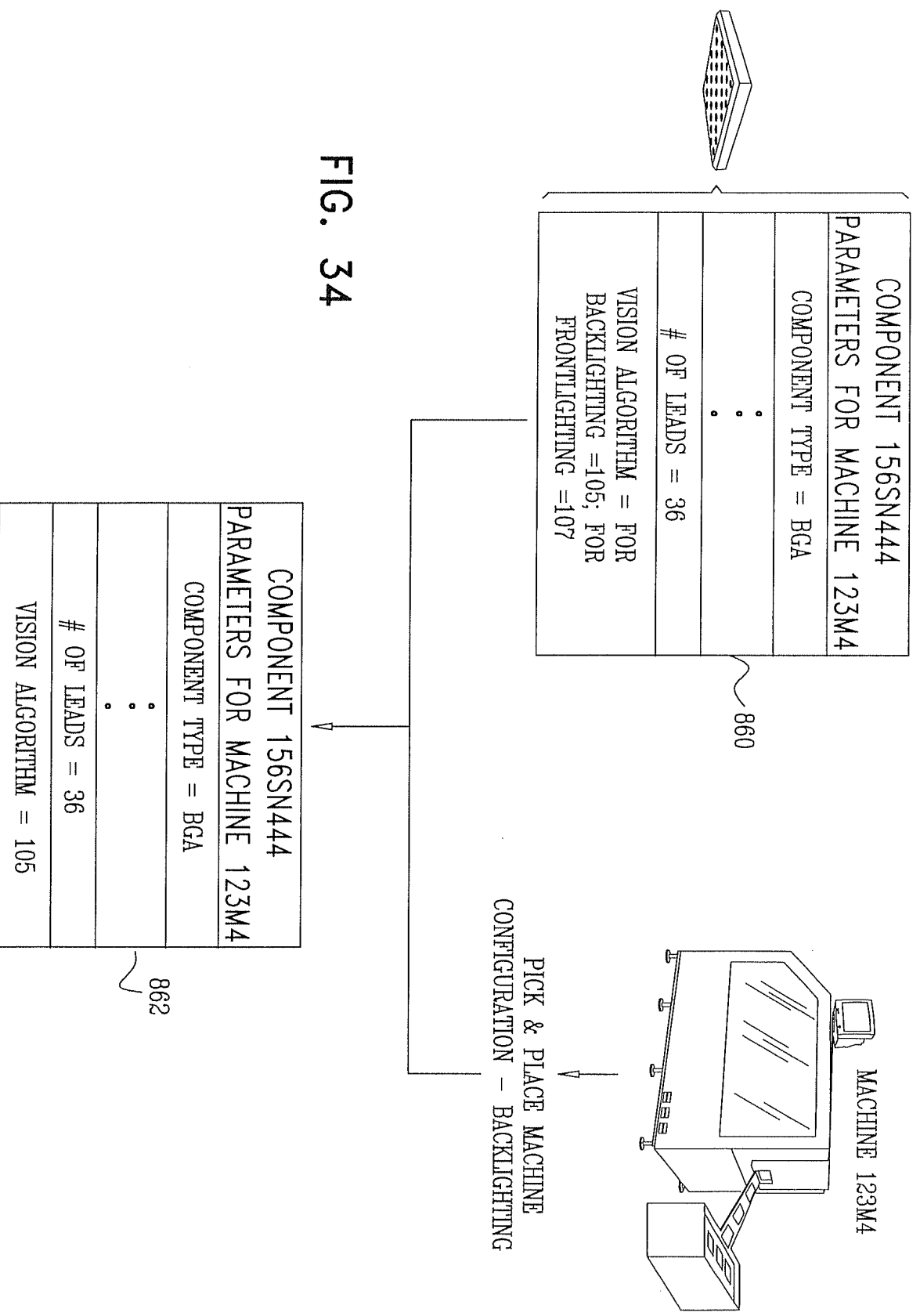
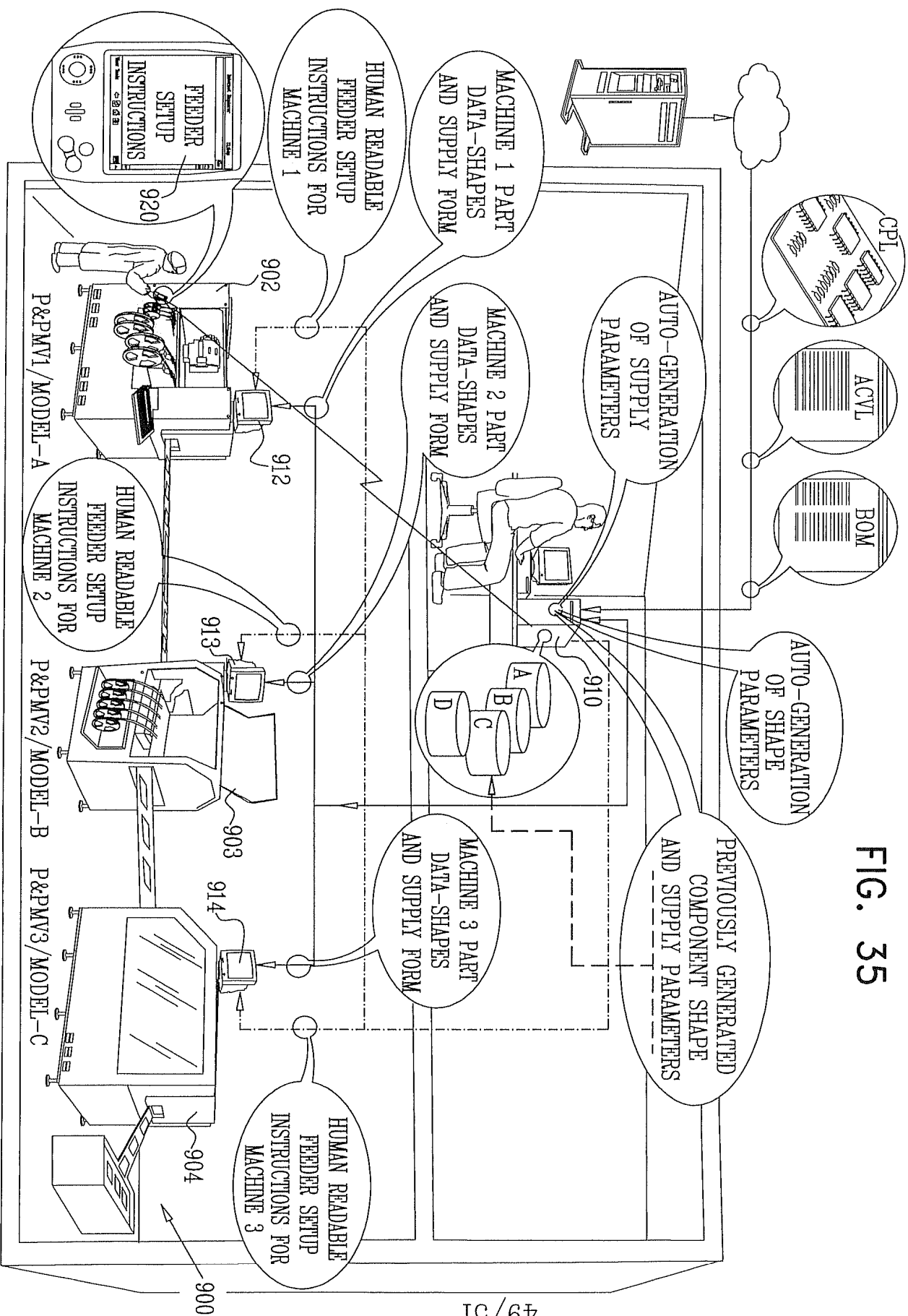


FIG. 35



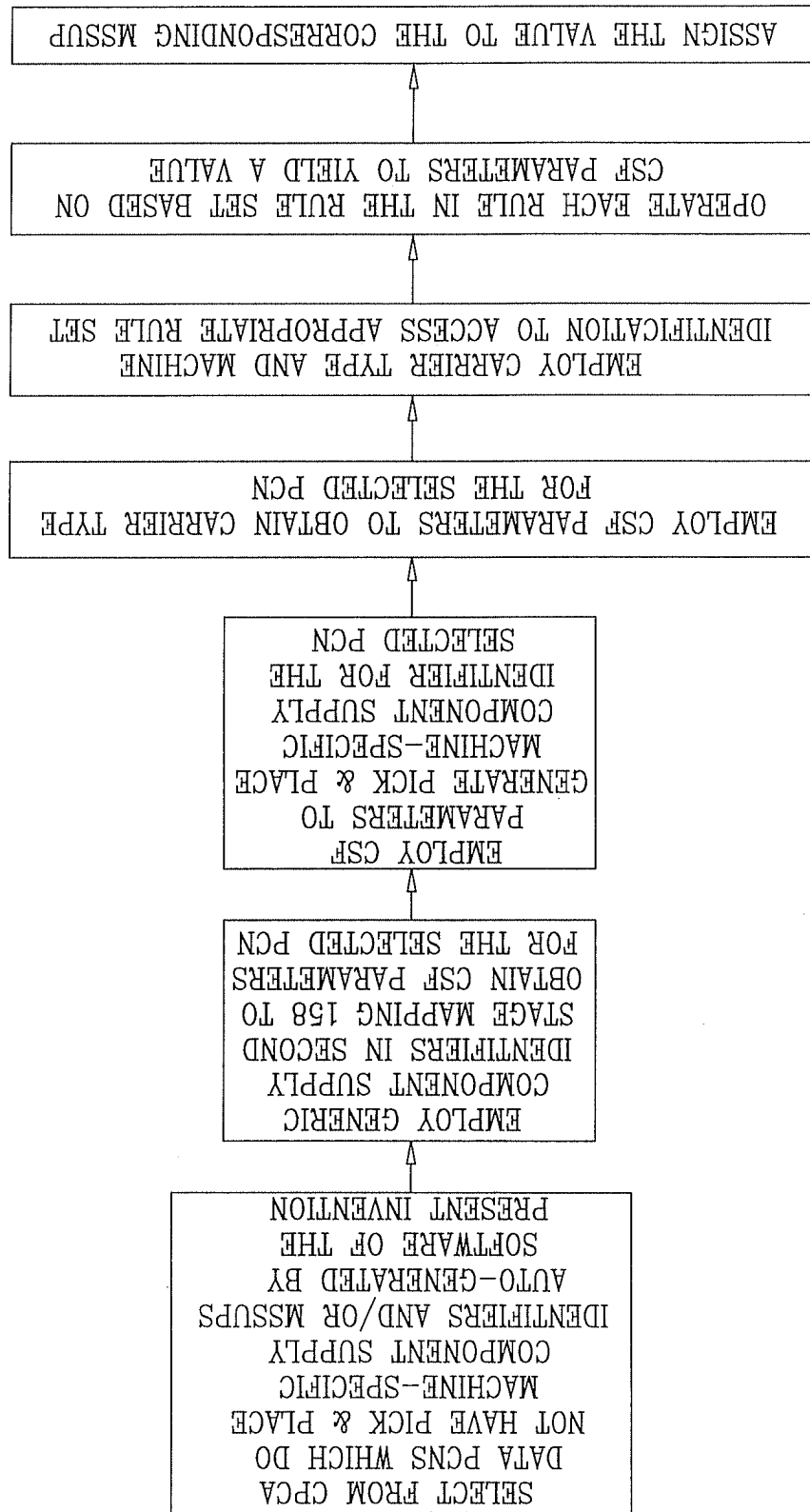


FIG. 36

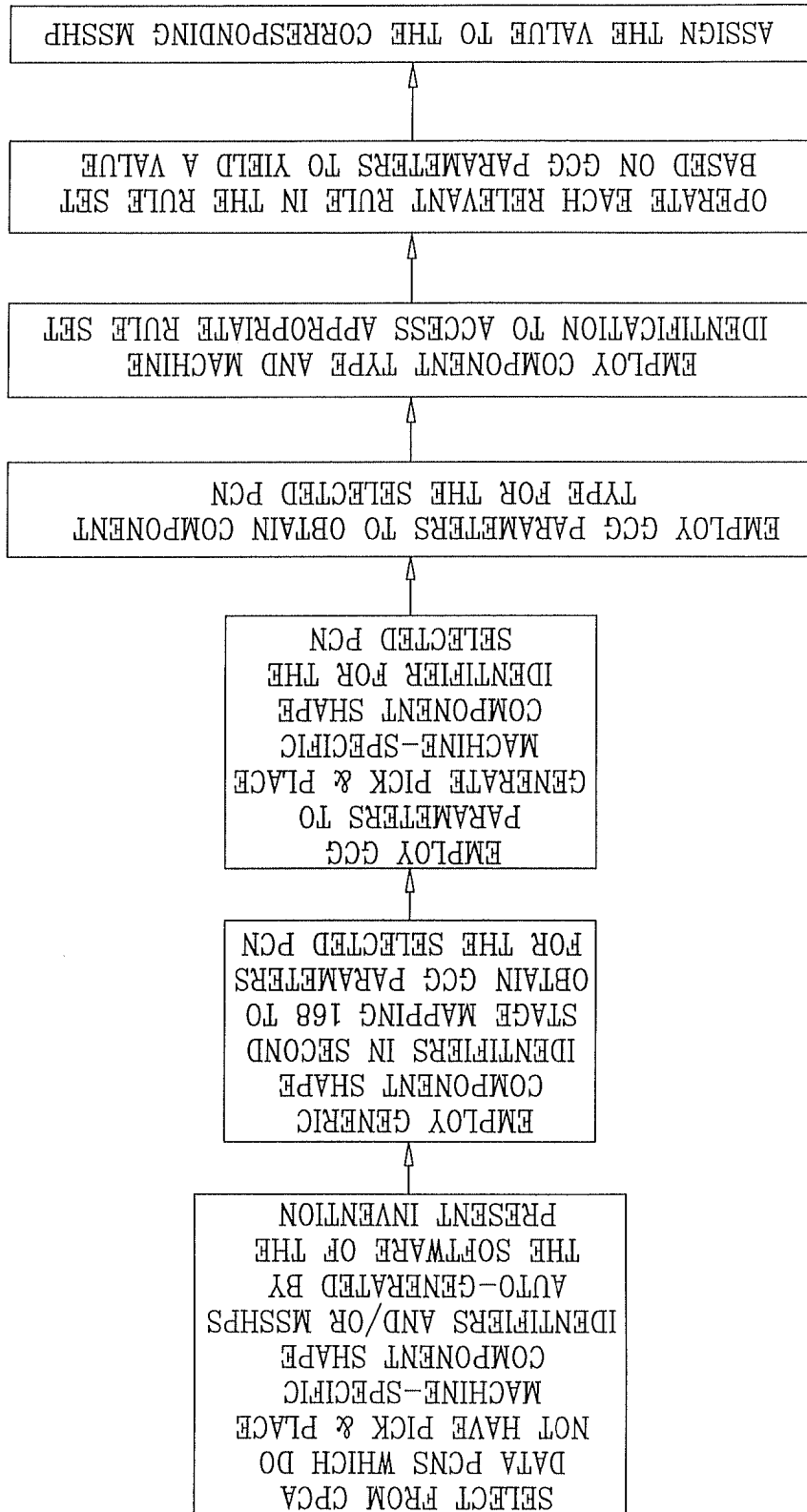


FIG. 37